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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ADDRESSES AND ORIGINAL ARTICLES

Pneumococcal Infections.—(II.)—Lobar Pneumonia in the Community. By ROBERT CRUICKSHANK, M.D.—(*Illustrated*) 621

Relationship of Albuminuria of Pregnancy to Chronic Nephritis. By G. W. THEOBALD, M.R.C.P.—(*Illustrated*).. 626

Grass-Pollen Antigen for Hay-Fever Desensitisation.—(II.)—Dosage. By JOHN FREEMAN, D.M.—(*Illustrated*) 630

Nutrition of the Heart in Relation to the Electrocardiogram and Anginal Pain. By K. SHIRLEY SMITH M.R.C.P. 632

CLINICAL AND LABORATORY NOTES

Air Embolism During Artificial Pneumothorax Insufflation. By V. R. WALKER, M.B. 636

Spontaneous Subarachnoid Hæmorrhage. By JOHN A. PAGE, M.B. 637

MEDICAL SOCIETIES

Royal Society of Medicine: Sections of Neurology and Physical Medicine.—Interstitial Neuritis 637
Section of Radiology.—Pathological Calcification and Ossification.... 639

Hunterian Society: Practical Dietetics 640

NEW INVENTIONS

A Hand Slit-lamp. By N. Bishop Harman, F.R.C.S.—(*Illustrated*) .. 642

REVIEWS AND NOTICES OF BOOKS

Significance of Phosphoric Esters in Metabolism. By Prof. R. Robinson, D.Sc., F.R.S. 643

L'angine de poitrine. By Prof. C. Lian 643

Clinical Gynecology. By Prof. C. Jeff Miller, M.D. 643

Walter Bradford Cannon 644

Epidemiology in Relation to Air Travel. By A. Massey, M.D. 644

Materia Medica, Pharmacology, and Therapeutics. By W. A. Bastedo, M.D. 644

Basic German for Science Students. By Marie L. Barker, Ph.D..... 644

LEADING ARTICLES

THE MECHANISM OF PROTEINURIA..... 645

A TEST OF TELEPATHY ... 645

THE NATURAL HISTORY OF RHEUMATIC FEVER.. 647

ANNOTATIONS

Two Views of Peptic Ulcer 647

The Strangeways Collection 648

Barbituric Hypnotics 648

The Interpretation of Chest Radiograms 649

Cellular Reaction to T.B. Partigens 649

The Quantum Theory of Infection..... 650

Tuberculous Meningitis... 651

Health of the Navy in 1931 651

The Liver in Catarrhal Jaundice..... 652

Dr. Eugen Cohn..... 652

New York Academy of Medicine..... 652

SPECIAL ARTICLES

B C G Vaccination Against Tuberculosis: Prof. Calmette's Reply to the Ministry of Health..... 653

Medicine and the Law: The Use of Experts.—Prejudice against Lunatic Asylums.—A Jury's Second Thoughts 655

Scotland: Mental Defectives and Sterilisation... 657

Ireland: A Clean Milk Bill 657

United States of America: Medical Students Abroad 657

Part-Time Consultant and Specialist Service: Criticism of L.C.C. Proposals 670

THE DOCTOR'S DAY

XX.—On the Urban Fringe 659

PANEL AND CONTRACT PRACTICE

Medical Benefit and the Unemployed.—Records Then and Now 658

CORRESPONDENCE

Food and Health (Mr. Somerville Hastings, F.R.C.S.)..... 661

The Acriflavine Treatment of Burns (Dr. N. Howard Mummery) 662

The Employment of Nembutal (Dr. Stanley Rowbotham) 663

The Blood Sedimentation-Rate (Dr. Hilary Roche) 663

The Cocktail in Hypoglycæmia (Dr. Courtenay C. Weeks) 664

Treatment of Enlarged Tonsils in Children (Dr. W. W. Jeudwine)..... 664

Oscillometry and the "Mean" Pressure (Dr. A. Graham-Stewart).... 664

The Intimate Nature of Nervous Activity (Mr. A. S. Blundell Bankart, F.R.C.S.) 665

PUBLIC HEALTH SERVICES

Ministry of Health on Local Expenditure—Birth- and Death-rates in Northern Ireland 665

Infectious Diseases in England and Wales.... 666

OBITUARY

Arthur Cooke, F.R.C.S.—(*With portrait*)..... 667

Montagu Lomax, M.R.C.S 668

THE SERVICES

Royal Naval Medical Service.—Royal Army Medical Corps.—Indian Medical Service.—Naval Medical Compassionate Fund 660

PARLIAMENT

Notes on Current Topics Pharmacy and Poisons Bill.—Health in the Villages.—General Exchequer Contributions Bill.—Shop Assistants' Hours.—Essex County Council Bill 668

House of Commons: Tuberculosis in the Navy.—Health Insurance Medical Benefit.—Rural Housing—Milk for Expectant Mothers—Vaccination and Death Certificates 669

MEDICAL NEWS

Roy. Coll. Sur. of England 671

Society of Apothecaries of London 671

Oxford Ophthalmological Congress 652

Action of Radium as Seen in the Pelvis 671

International Hospital Association..... 671

Eugenics Society 671

London Inter-Collegiate Scholarships Board..... 671

Univ. of Birmingham..... 671

Journées Médicales de Bruxelles 671

Instruction for the D.P.H. 671

Irish Medical Schools and Graduates' Association.. 671

Nurses' Home at Govan... 671

Tuberculosis Association.. 671

London Homœopathic Hospital..... 672

A Children's Hostel..... 672

St. Andrew's Hospital, Dollis Hill 672

New Hospital at Lahore... 672

Royal Free Hospital..... 672

Progress of Cremation.... 672

NOTES, COMMENTS, AND ABSTRACTS

Nicholas Culpeper. By CECIL WALL, F.R.C.P... 673

Duty on Letter-press..... 675

The Musk-Rat in Britain.. 675

Theft of Drugs from Motor-cars 676

Medical Diary 672

Appointments 672

Vacancies 676

Births, Marriages, Deaths 676

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LECTURER IN BACTERIOLOGY, THE UNIVERSITY AND ROYAL INFIRMARY, GLASGOW; BACTERIOLOGIST TO GLASGOW ROYAL INFIRMARY

II.—LOBAR PNEUMONIA IN THE COMMUNITY *

In the previous lecture certain clinical features of lobar pneumonia were considered. I propose now to discuss this affection in its public health aspects; reviewing, in particular, bacteriological and epidemiological evidence relating to the seasonal incidence and mode of spread of lobar pneumonia, and the factors which influence its mortality-rate in an infected community. I shall consider first the case-mortality of the infection which depends primarily on the inter-relationship between the virulence of the infecting organism and the resistance of the exposed persons in the community.

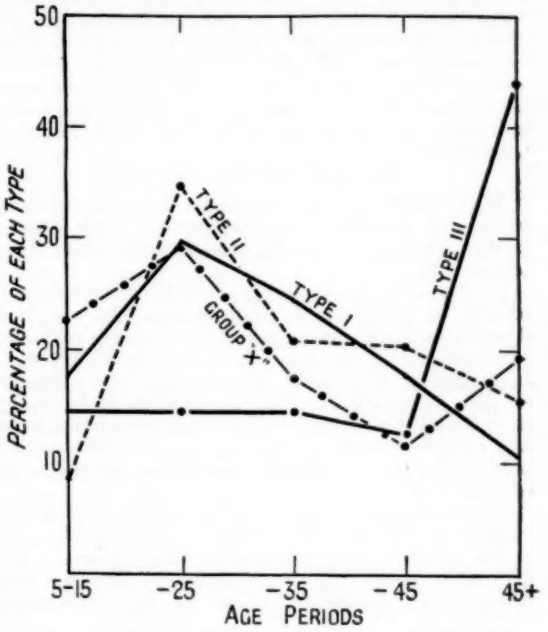
The Infecting Organism

It is customary to ascribe the variations which occur in the severity and mortality of a particular infection from time to time to changing degrees of virulence of the infecting organism rather than to altered resistance of the host. This doctrine has been accepted perhaps too readily as a sufficient explanation of the epidemiological facts, and there is evidence that this theory may have to be modified or even discarded. For instance, the experimental observations of Webster show that the virulence of such organisms as those concerned in mouse typhoid or in pasteurellosis of rabbits is the same at the beginning as at the end of an epidemic and from one epidemic to another, is the same whether the animals die of an acute or of a chronic infection, is unaltered in healthy contacts, and is not increased by animal passage. This view, as applied to infections generally, may seem heterodox, but it is quite possible in spite of criticism that it is fundamentally correct. It has, at any rate, the asset of being based on results obtained from naturally occurring infections in animals. Unfortunately for its application to lobar pneumonia, there is presented in this disease the problem of an infection caused by a series of organisms, each of the members of which seems to possess its own degree of virulence. It is necessary, therefore, to study the behaviour of each type of organism as a separate epidemiological problem, and for this purpose to ascertain the relative incidence of the different pneumococcal types as infecting organisms in a particular community. When the part which the infecting organism plays in the mortality-rate of lobar pneumonia is to be assessed, therefore, the questions which arise are: (1) Is the proportion of the different types the same in different countries or in different parts of the same country—e.g., in Britain and America, in London and Glasgow? (2) Is the proportion constant from one year to another in the same community? (3) Since age is an important factor in the mortality from pneumonia, do the several types attack the same or different age-groups?

(1) It will be seen at once (Table I.) that the incidence of Types I., II., III., and Group "X" pneumonia varies in different countries. If only America and Britain are compared, in the former country Types I. and II. account for 50–65 per cent., Type III. 10–15 per cent., and Group "X" 25–35 per cent. of the infections, whereas in Glasgow the corresponding figures are 70–75 per cent., 3–4 per cent., and 20–25 per cent. A possible explanation of the difference in incidence will be discussed later, but it is obvious that comparison of the crude mortality-rates from lobar pneumonia in the two countries would be unfair unless the differing incidence of the pneumococcal types are taken into account.

(2) The case-mortality from lobar pneumonia may vary considerably from year to year. This variation might be the result of an alteration in the incidence

PERCENTAGE DISTRIBUTION IN AGE-GROUPS of Types I., II., III., and Group "X" pneumonia (1115 cases)



of the infecting types apart from a change in the virulence of any individual type or a variation in the quality of the exposed community. There is some evidence that the relative incidence of the infecting types varies in the same community in different seasons—e.g., Griffith (1928) found in the Smethwick district of London that Type II. pneumonia diminished from 32·6 in 1920–22 to 7·4 per cent. in 1924–27, while there was a corresponding increase in Group "X" infections from 30 to 53·7 per cent. Cecil, Baldwin, and Larsen (1927) in a five-years' survey also reported variations from year to year. Our own figures—based on 875 cases—in three successive winters for Types I., II., III., and Group "X" pneumonia are February–September, 1930, 32, 45, 2, and 19 per cent., September, 1930–August, 1931, 37, 32, 5, and 24, and September, 1931–August, 1932, 37, 30, 4, and 29 per cent., an increase during the three years in Type I. and Group "X" infections, and a corresponding decrease in those of Type II. These figures are open to the criticism that they are not representative of all the cases of lobar pneumonia in the infected community. Nevertheless, in order to contrast the severity of lobar pneumonia in the same community in different years, an accurate

* The second Milroy lecture for 1933 delivered before the Royal College of Physicians of London on Feb. 28th. Lect. I. appeared in our last issue.

knowledge of the incidence of the infecting types in each year would seem to be essential.

(3) An investigation of the age-incidence of Types I., II., III., and Group "X" pneumonia might be undertaken to discover what difference exists in the age-distribution of the different types, and to compare the age-incidence of the same types in different countries and localities. There are not many available figures relating to these points. Our results indicate that Type III. infections are most common in older individuals, while Group "X" pneumonia, although sharing in the general increase during the third and fourth decades, has a predilection for the young and the old, say under 10 and over 50. Cecil and Plummer (1932) have made an analysis of the age-incidence of Types I. and II. pneumonia, and a comparison of their figures with those of Glasgow shows that in both groups Type I. pneumonia is rather more common in the "teens," while Type II. pneumonia has its greatest incidence in the third decade of life (see Figure). This is in itself an interesting and unexplained phenomenon. Perhaps the apparently greater invasiveness of Type I. pneumococcus (see Lecture I.) may be concerned in the greater incidence of this infection in the more resistant adolescent.

The Infected Community

With regard to the resistance of the community exposed to infection, there are three or four obvious factors which influence the mortality-rate from lobar pneumonia.

(1) *Age.*—In typhus and typhoid fever the influence of age on prognosis is well known. In the case death-rate from lobar pneumonia also age is of paramount importance (see Lect. I., Fig. 2), although in statistical statements of mortality the influence of age of attack is often overlooked, particularly in estimating the value of remedial measures, such as antipneumococcal serum, or in contrasting mortality-rates in different institutions on the basis of small numbers.

(2) *Constitution.*—This may be interpreted rather vaguely as the inherited resistance of a community. If the incidence and death-rates from Types I., II., III., and Group "X" pneumonia in America and Glasgow are compared (Table I.), two differences

TABLE I

The Incidence of and Mortality from Pneumococcal Types in Lobar Pneumonia in Various Countries.

Country.	Year.	No. of cases.	Percentage incidence of types.			
			I.	II.	III.	X.
U.S.A. (Rockefeller Institute).	1913–17	454	33·3 (11·6)*	29·3 (28·5)	13·0 (43·0)	24·6 (12·8)
U.S.A. (Bellevue Hospital).	1920–30	4310	32·1 (28·2)	23·0 (48·9)	11·1 (42·7)	33·8 (31·3)
Denmark (Christensen and Jurgens).	1923–25	298	28	28	10	34
Britain (collected; Dible).	1921–31	766	34·4	31·4	3·7	30·6
Glasgow.	1930–32	1215	36·2 (10·8)	35·5 (21·5)	3·6 (40·9)	24·7 (8·6)

Figures in parentheses represent case-mortality rate.
* Mostly serum-treated.

are apparent—(*a*) a greater incidence in America of Type III. and Group "X" pneumonia; (*b*) a higher mortality-rate for all pneumococcal types in that country. Type III. and Group "X" pneumococci are apparently much less infective or invasive organisms than Types I. and II., being found frequently in the throats of normal people and tending to infect older and debilitated persons. The frequency of these types as a cause of lobar pneumonia in America suggests a lessened resistance of the community to pneumococcal infections in general, a suggestion borne out by the higher mortality from lobar pneumonia in America than in Britain. Support for this contention is also gained by comparing the mortality-rate from lobar pneumonia in the Bellevue and the Rockefeller Institute Hospitals, which admit different classes of patients (Cecil, 1932, see Table I.). The Southern races, among whom pneumonia is not so common, are apparently less resistant to the infection when they migrate to districts where this affection is more prevalent (see also Lister, 1913).

(3) *Climate.*—Meteorological conditions may influence the incidence and possibly also the mortality of lobar pneumonia in two ways. The greater severity of this affection during the spring months may be associated with a general lowering of resistance, owing to such factors as the absence of sunlight and lower respiratory exchange (Madsen, 1930). For example, Macgregor (1933), in an analysis of the deaths from lobar pneumonia in the isolation hospitals in Glasgow during 1930–31, found that the death-rate was highest in the first four months of the year (20–21 per cent.), lowest in the four summer months (12 per cent.), and intermediate in the last four months (15–16 per cent.). From January to April, 1932, following an exceptionally mild winter, the death-rate was only 13·6 per cent. Again, in a city like Glasgow, where meteorological conditions predispose to recurring minor respiratory infections, the relationship of these to the incidence of lobar pneumonia is quite unknown and well worth investigation. It is possible that some of these infections may increase the general resistance to the pneumococcus. On the other hand, resistance may be weakened, as undoubtedly happens when influenza is present in the population. One may conclude by saying that the factors affecting the general mortality from pneumonia are so complex that very great caution has to be exercised when comparing the death-rate in different countries, or even in different towns in the same country. The principal factors for which allowance must be made are the incidence of the different pneumococcal types, the prevailing age of attack, the constitution of the individuals exposed to infection, and the climatic conditions.

The Seasonal Incidence of Lobar Pneumonia

Pneumonia in Britain is notifiable as "acute primary pneumonia" or "acute influenzal pneumonia," which means that no opportunity is afforded of determining separately the incidence of pneumococcal lobar and broncho-pneumonia. In January, 1931, the International Classification of Causes of Death made provision for discarding the use of the term "pneumonia," and the practitioner is asked to state, if possible, whether the case was one of lobar or broncho-pneumonia. Although it is impossible therefore to estimate completely the seasonal incidence of lobar pneumonia, Macgregor (1933) has recorded separately for Glasgow (January, 1930–June, 1932) the weekly deaths from lobar and broncho-pneumonia in the age-group 10–55, when confusion between the two infections is least likely to occur. There is every winter a regular and sustained increase in the deaths from lobar pneumonia during the first four months of the year, and even allowing for a slightly higher case-mortality rate during this period it seems obvious that the greatest

incidence of lobar pneumonia in Glasgow occurs in January to April. When this spring incidence of lobar pneumonia was compared with the annual mass movement of the pneumonias in the city as indicated by the notified cases, it was found that there was no correlation—e.g., "in 1929–30 the winter prevalence (of 'pneumonia') took the form of a sustained fluctuating curve; in 1930–31 an abrupt ascent took place in the middle of November reaching epidemic proportions during the first three weeks of December; in 1931–32 the salient feature was the onset of a sudden explosive incidence lasting for ten weeks from the end of February to the middle of April"—I quote from Macgregor's paper. Support for Macgregor's analysis is obtained from Denmark where lobar pneumonia, broncho-pneumonia, and tracheo-bronchitis are separately notified. Madsen (1930) has compared the seasonal incidence and death-rate from these three infections, and his charts show that whereas broncho-pneumonia and tracheo-bronchitis have superimposed curves, lobar pneumonia has an independent curve occurring later in the winter.

The Spread of Lobar Pneumonia in the Community

Consideration may now be given to lobar pneumonia as a specific infectious disease and the mode of spread of the infection. What are the accepted facts? That the known infectivity of lobar pneumonia is of a low order is attested by the rarity of the occurrence of more than one case in a family, the comparative absence of the disease among nurses and others attendant upon patients, and the infrequency of epidemic outbreaks. As regards seasonal incidence, lobar pneumonia conforms to the behaviour of an infectious disease, although possibly this may be dependent upon changes in the resistance of the community. Again, there is the evidence of the bacteriological facts. Although 70–75 per cent. of cases of lobar pneumonia are due to Types I. and II. pneumococci, these types are rarely found in the throats of healthy persons, whereas those of Type III. and of the heterogeneous Group "X" pneumococci are carried either constantly or intermittently by 30–90 per cent. of the community. These bacteriological facts would in themselves point to the likelihood that lobar pneumonia is, in the main, caused by an exogenous infecting organism. However, Griffith (1928) has demonstrated that one type of pneumococcus may be changed into another by injecting a live "rough" culture of pneumococcus A along with a killed "smooth" emulsion of pneumococcus B into mice from which were recovered a living smooth B type. A similar change of type has since been accomplished in vitro (Dawson and Sia, 1931), and it may be added that Goebel and Avery (1931) have succeeded in linking a derivative of Type III. S.S.S. to horse serum globulin, thus producing a synthetic Type III. pneumococcus which behaves antigenically exactly like the natural organism. Griffith further observed that after an attack of lobar pneumonia the infecting pneumococcal type might quickly disappear from the patient's respiratory tract and be replaced by Group "X" pneumococcus. The important practical question is, Does change of type occur under natural conditions?

As regards the phenomena of infection, therefore, two possibilities present themselves. Lobar pneumonia may be presumed to result from either a biological change in the saprophytic group "X" pneumococci to the more infective Types I. and II., or, on the other hand, infection with an exogenous Type I. or II. pneumococcus derived from an acute clinical case, a convalescent carrier, or a healthy contact carrier, provided these are shown to exist, and provided this chain of events can be demonstrated. It seems somewhat paradoxical that there should exist in nature some 30 fixed immutable types of pneumococcus, of which only two or three should constantly act as infecting strains. It is more natural to assume that the several strains are capable of mutation under certain circumstances in response to changing environment. On the other hand, multiplicity of serological types of a particular species is not exceptional in the bacteriological world. For instance, the hæmolytic streptococcus group comprises many serological types, as do also the dysentery and paradysentery bacilli, or even the coli-typhoid group. Further, in the typhoid-salmonella family there are close affinities in the "rough" state, but it is not suggested that *B. typhosus* may under natural conditions assume the characters of Gaertner's bacillus. As an indication of the stability of the pneumococcus, Neufeld reminds us that his original Type I. has maintained its specificity in artificial culture for almost a quarter of a century. A further fact of importance is that before change of type can occur in the pneumococcus under the experimental conditions mentioned, the original type must be denuded of its capsule; it is rare to find a wholly "rough" strain of pneumococcus in the throat by cultural methods (Webster and Hughes, 1931). Thus the occurrence of biological change in the pneumococcus under natural conditions is a phenomenon which there is little chance at present of either proving or disproving, while there are several considerations in favour of the other view which should be closely examined.

The evidence in support of the argument that lobar pneumonia is infectious may be advanced along the following lines: the occurrence of epidemics due to a particular type of pneumococcus, the infectivity of the acute case, and since this is apparently low, the occurrence of convalescent and contact carriers and the infectivity of these carriers.

Epidemicity of lobar pneumonia.—Although lobar pneumonia in epidemic form has been frequently reported—e.g., in Italy during the eighteenth century—it is only within recent years that bacteriological proof of its "epidemicity" has been available. Stillman (1917) reported two small epidemics caused by Type I. pneumococcus, while Nichols' account (1917) of an outbreak of lobar pneumonia among American recruits in a camp of 43,000 men at El Paso in 1916–17, beginning on Nov. 1st and reaching its peak in February, has the features of a true epidemic. Among the typed cases 78 per cent. were due to Types I. and II. pneumococcus, and there was direct evidence of tent, company, and regimental contagion. Perhaps the best record of the kind is that of Strøm † (1932) who in an isolated orphanage reported 12 cases of lobar pneumonia and 2 cases of otitis media among 87 boys, aged 5–20, between Feb. 10th and June 15th, 1931. Type I. pneumococcus was recovered in all the cases examined in the acute stage. It is noteworthy that the attack-rate was greatest and the infection most severe among the boys who had been longest in the orphanage. Numerous other epidemiological data could be given—the localised outbreaks noted by Baerman (1914) among the labourers on a Java plantation, the greater incidence of pneumonia at public boarding schools among boys who have common dormitories than among girls who sleep in cubicles (Glover, 1932), and Macgregor's evidence

† I am indebted to Miss R. Gulbransen for the translation of this paper.

that lobar pneumonia has apparently a regularly recurring spring prevalence independent of broncho-pneumonia. In our own series, pneumonia due to Types I. and II. pneumococci, the epidemic types, always constituted a higher proportion of the cases during the winter than in the summer period—e.g., the percentage of these types together in four-monthly periods from September, 1930, to September, 1932, was 70, 73, 62, 70, 64, and 47. The only figure under 70 during the winter occurred in the first quarter of 1932, a period of exceptionally mild weather and low mortality.

The Infectivity of the Acute Case.—Although the infectivity of lobar pneumonia is admittedly low, we have collected during the present investigation seven instances of direct contact infection of Types I. and II. pneumonia. Three of these comprised one case each of contact infection, and a fourth two cases of contact infection from patients with Type I. lobar pneumonia. The remaining three were Type II. contact infections, among them a family in which father, mother, and two sons were all affected within a period of 19 days, and three of whom died. These instances of contact infection constitute only a small proportion of all the pneumonia patients, but at least they demonstrate the infectivity of the disease.

Contact and Convalescent Carriers of Types I. and II. Pneumococcus

The Contact Carrier.—Stillman (1916) and later workers (e.g., Rosenau et al., 1926) have found that a proportion of the intimate contacts of patients with lobar pneumonia may temporarily harbour the same pneumococcal type. The figures for the Rockefeller Institute (1917) were for Type I. pneumonia 21 positive out of 160 contacts (13·1 per cent.), and for Type II. 18 out of 149 (12·1 per cent.). Through the courtesy of the workers in the other hospitals (Anderson, Christie) I have collected the findings from the examination of 139 specimens of sputum or pharyngeal swab from nurses in contact with lobar pneumonia. Type I. or II. pneumococcus was recovered 25 times (18 per cent.), whereas in a control group of 88 non-contact nurses these types were never found. Christie (1932), who has followed up this aspect of the investigation, found that as a rule the carrier state was only temporary, although one nurse became a persistent carrier of Type II. pneumococcus. Nevertheless, pneumonia among the nursing staff of the Glasgow Isolation Hospitals is a rare occurrence. In confirmation of the readiness with which pneumonia contacts become carriers are our findings from the examination of the sputum of patients admitted into the pneumonia wards with the diagnosis of pneumonia but found subsequently to be suffering from some other disease. From most of these patients more than one specimen of sputum was obtained and either at the first examination but more often at the second or third, Type I. or II. pneumococcus was recovered from 26 of 156 cases (16·6 per cent.). Some of these patients became persistent carriers of Type I. or II. pneumococcus, others quickly lost the organism or picked up another—e.g., Type III. pneumococcus. Regarding the infectivity of the contact carrier we have one record of a patient apparently infected by a healthy carrier. It is opportune at this point to mention that Stillman frequently found Types I. and II. pneumococci in the dust of pneumonia wards, whereas these types were rarely present in dust from control rooms.

The Convalescent Carrier.—It is almost a biological law of infections that after the acute phase of the disease there is a gradual elimination of the infecting organism. At first the curve falls rapidly and then less and less steeply until it becomes practically a straight line, running parallel to the base and representing a residuum of chronic carriers of the infecting organism. This phenomenon is best demonstrated in the diseases in which it has been most studied—diphtheria and typhoid fever (Medical Research Council monograph on diphtheria: Thomson and Mann (1927), Garbat (1922)). The workers at the Rockefeller Institute recognised the possibility of the convalescent carrier in lobar pneumonia, and in a follow-up of their cases found that the infecting pneumococcus persisted for varying periods up to 90 days. But as a rule the organisms disappeared rapidly from the throat in convalescence. Dr. Montgomery and I (1932) have returned to this problem in our investigation. At first sputum was obtained from the majority of cases of lobar pneumonia, twice if possible before the end of infection, and then at four- to seven-day intervals from the time that the temperature became normal until the patient was dismissed from hospital. Table II. shows

TABLE II

Convalescent Carriers of Types I. and II. Pneumococcus (250 cases).

Days after crisis.	Number of cases.	Number positive.	Percentage positive.
0– 4	184	114	60·8
– 8	122	58	47·5
–12	89	39	43·8
–16	52	26	50·0
–20	43	18	41·8
–24	26	9	36·6
25–42	29	18	62·0

the results obtained in 250 patients with Type I. or II. infection, cases due to the other type being omitted owing to the difficulty of proving that the Group "X" pneumococcus was always the same serological type. It will be seen that the proportion of carriers fell from 60 per cent. immediately after crisis to 35 per cent. three weeks later, while in a group which, mainly because of complications, such as delayed resolution, empyema, lung abscess, were

TABLE III

Incidence of Convalescent Carriers of Types I. and II. Pneumococcus among 122 Patients Examined 2–26 months after recovery.

Months after recovery.	Number of cases.	Number positive.	Percentage positive.
2– 4	52	19	38·4
– 6	49	11	22·4
– 8	59	10	16·9
–10	55	7	12·7
–12	35	7	20·0
–14	25	4	16·0
–18	11	2	—
–26	16	2 (21 & 25 mths.)	

retained longer in hospital, the incidence of carriers was 62 per cent. We therefore decided to follow up a series of cases convalescent from Types I. and II. pneumonia at two-monthly intervals after their dismissal from hospital. Up to the end of 1932 122 cases have been so examined for periods varying from 6 to 26 months, but because of the fact that the investigation was not started until the first lot of cases were already six months out of hospital, the numbers examined during the first six months after infection are no greater than those during the second six months (Table III.). Naturally some of the cases did not attend regularly, but we tried to avoid any tendency to selection. We do not claim

for our results that they represent the *proportion* of chronic carriers which are likely to develop after lobar pneumonia. It is enough to have shown that a chronic carrier state exists, and that therefore the chronic carrier must be regarded as a potential source for the spread of infection. In the present investigation we have collected five instances where the convalescent carrier was presumably the source of infection —e.g., two instances in which the brothers of patients with Type I. pneumonia were also admitted with Type I. pneumonia a month after the first patient went home.

The Habitat and Virulence of the Pneumococcus in the Carrier State

Certain questions arise regarding the carrier state —for example (1) Where is the organism carried? (2) Is it of equal virulence with the pneumococcus during the active stage of infection? (3) What predisposes to the chronic carrier condition? We have given some attention to these points.

(1) In examining cases for the carrier state we obtained both a throat-swab from the tonsillar region and a specimen of sputum which was often only mucoid material, and was presumably derived from nasopharynx or respiratory tract proper. The throat-swab was inoculated into 10 c.cm. of Hartley's broth, which was incubated overnight (14–15 hours), and then 0·5 c.cm. of the culture inoculated intraperitoneally into mice. The sputum, emulsified in broth, was similarly injected into mice. The results obtained among 42 positive cases showed that the sputum was positive alone 34 times, the throat-swab alone 5 times, and both were positive 3 times. It would thus seem that the habitat of the organism in the carrier is most frequently the nasopharynx or upper respiratory tract and less often the fauces. An attempt was also made to compare the value of sputum, postnasal, anterior nasal, and throat-swabs in recovering the pneumococcus from carriers; in nine positive cases the pneumococcus was recovered from the sputum every time, five times from the postnasal swab, twice from the anterior nares, and once from the throat.

(2) It is not easy to estimate accurately the virulence of a particular strain of pneumococcus for the mouse (see Topley, 1926), and therefore comparative tests of virulence are not likely to be of value unless enormous numbers of mice are used. Since this was not possible in our work, we cannot draw conclusions from our crude estimates of virulence. Certain points which emerged may be mentioned. It soon became apparent that it was valueless to state that the pneumococcus killed in a dilution of, say, 10^{-7} of an 18–24-hour culture using 0·5–1 c.cm. doses, since such a statement gives no information about the number of pneumococci contained in such a dose. I found out also, as Wadsworth and Kirkbride (1918) had already pointed out, that pneumococci, apparently avirulent for the mouse after 24 hours' cultivation in broth, were usually highly virulent at the commencement of their maximum period of growth. I have therefore used for virulence tests six-hour cultures of the organism in 10 per cent. blood broth, inoculated fairly heavily from the first subculture on blood-agar. Serial dilutions were made in broth—it is essential to use a fresh pipette for each dilution—and measured quantities were plated in blood-agar at the time the animals were being inoculated. While no large series of cases have been so examined, our results seemed to indicate that there was no appreciable difference in the virulence of a pneumococcal strain examined during the acute and convalescent stages of infection, that the strains from contact and chronic carriers were not less virulent to the mouse than those from acute cases, and that Type II. pneumococcus was lethal to the mouse more quickly than Type I. pneumococcus.

(3) In an attempt to discover a cause for the carrier state, Dr. Montgomery has made a careful examination of the upper and lower respiratory tract of the return cases—e.g., the state of the tonsils, turbinates, nasal septum and the sinuses and the presence of bronchitis—and I have examined, at varying periods after convalescence, the blood of a number of carriers and non-carriers for the presence of protective antibody. While the results of these examinations cannot be detailed here, it may be stated that the majority of the chronic carriers suffered from some pathological condition of the upper respiratory tract, or from chronic bronchitis, whereas similar affections were less frequently present among the non-carriers. Specific protective antibody was usually demonstrable alike in carriers and non-carriers early in convalescence and tended to disappear equally in both groups. It seems likely that the predisposing factor to the carrier state is an unhealthy condition of the mucous membrane of the upper respiratory tract which allows the organism, although highly virulent, to live what McCartney has called an extracorporeal existence. There is no reason to suppose that the chronic pneumococcus carrier is any less dangerous to the community than the chronic diphtheria or typhoid carrier.

Let us summarise our knowledge and try to picture the mode of spread of lobar pneumonia in the community. Bacteriologically investigated epidemics of lobar pneumonia have been shown to occur not infrequently. The spring prevalence of lobar pneumonia in communities where the infection is endemic might be regarded as possessing the features of an infection of low case-to-case infectivity, presupposing a fairly high carrier incidence before the disease reaches its maximum prevalence. Healthy or contact carriers, usually transient, and convalescent carriers whose carrier state may be more permanent, occur in considerable proportions, and records suggestive of their infectivity have been obtained. There still remains, however, the anomaly of the apparent rarity of Types I. and II. pneumococcus carriers among random samples of the community (Avery et al.: Ministry of Health Reports on Public Health, &c., No. 58; Cruickshank (unpublished)). A criticism that may be made of many of the investigations on this point is that they have been conducted usually on samples of the population among whom lobar pneumonia is uncommon—e.g., students, office staff, &c. Lobar pneumonia is much more common in certain trades than in others, such as steel workers (see Vernon, 1920), and in this connexion there may be quoted the findings of Sydenstricker and Sutton (1917), who in a sample of 100 healthy negroes employed in the Bethlehem steel works, Baltimore, where pneumonia was prevalent, found six Type I. and six Type II. pneumococcus carriers. Thus there is a strong case for the infectivity of lobar pneumonia which seems to have epidemiological features similar to cerebro-spinal fever, although a high incidence of healthy carriers of the epidemic types (I. and II.) has not yet been proven.

Summary

A comparison of the death-rate from lobar pneumonia in different communities, or in the same

locality in different years, can only be made if due attention is given to such factors as the percentage incidence of the several pneumococcal types, the age-distribution and constitution of the exposed community, and the climatic conditions. No accurate data are available about the relative incidence of lobar pneumonia in this country, and a plea is made for the separate notification of lobar and broncho-pneumonia. Evidence is adduced in favour of the view that lobar pneumonia is an infectious disease endemic in large cities, with an annual winter epidemic, reaching maximum prevalence in the spring. The reservoirs of infection may be the contact and convalescent carriers, both of whom have been shown to occur in considerable proportion. Further investigation is required to clarify the mode of spread of the infection.

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THE RELATIONSHIP OF THE ALBUMINURIA OF PREGNANCY TO CHRONIC NEPHRITIS

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UNTIL the second decade of the present century it was believed that almost the only risk attaching to the albuminuria of pregnancy was that it might develop into eclampsia, and the only dangers associated with eclampsia were the immediate maternal and fœtal mortality. In 1921, however, Caldwell and Lyle [1] reported that 2 out of 22 patients who had recovered from eclampsia were found at a later date to suffer from chronic nephritis. In the same year Gibson [2] took a much more gloomy view of the sequelæ and late results of the toxæmic albuminuria of pregnancy, and suggested that such women should not be allowed to place their lives in jeopardy by again becoming pregnant. Six years later Young [3] reported that several of his patients had had eclampsia more than once, and that the subsequent obstetric histories of a considerable proportion of his patients who had suffered from the toxæmias of pregnancy were anything but satisfactory. In a more recent paper [4] he estimates that in England and Wales between 7000 and 10,000 women annually acquire a more or less persisting disability as a result of the pregnancy toxæmias. In 1931 Peckham and Stout [5] opined that one out of every three women who suffer from a toxæmia of pregnancy (excluding vomiting and eclampsia) will ultimately be found to have nephritis. Stander and Peckham [6] in the same year stated that nephritis associated with pregnancy occurred more frequently in women between the ages of 30 and 40, and assumed that multiparity per se was an important predisposing factor. Of 236 patients diagnosed as nephritics only 135 were traced. Of these 46 had died, 37 from nephritis, while the average duration of life after the condition had been diagnosed was only 3·37 years.

Other papers expressing similar views could be quoted, but that by Gibberd [7] is the only one concerned with results in England. After giving valuable figures from the practice of Guy's Hospital he asserts, that, if the standards of treatment which in the past have been considered adequate be adopted, at least 10 per cent. of previously healthy women who suffer from albuminuria during pregnancy will develop chronic nephritis. Not only must a woman who wishes to have a baby accept a 0·4 per cent. risk of death during pregnancy, childbirth, or the puerperium, but also a 0·5 per cent. risk of acquiring chronic nephritis over and above a much higher risk of subsequent ill-health. In other words, the remote mortality from childbirth is greater than the immediate.

This alarming contention is based on the results of the subsequent investigation of 89 out of 300 cases of albuminuria. Of these 89 women, 79 were stated to be healthy before pregnancy, although when examined at a later date 9, or 11·4 per cent., were found to be suffering from chronic nephritis. The following objections to such a contention offer themselves:

(1) Only 89 out of 300, or 30 per cent. of the cases, were subsequently investigated.
(2) It was assumed that because the specimen of urine examined when the patient first came under observation did not contain albumin, she did not suffer from nephritis.
(3) The criteria on which a diagnosis of nephritis is made are not specified.
(4) The ages of the patients are not mentioned.
(5) The numbers are far too small to allow of such an important conclusion being reached.
(6) No control observations have been made on comparable numbers of unmarried women.

As similar objections could be offered to the conclusions arrived at by the other authors, it occurred to me that the national data available at the General Register Office might throw light on the subject. Through the courtesy of the Registrar-General for England and Wales, to whom I express my sincere thanks, I have been able to study the Decennial Report for 1911–1920, prior to its publication, and other relevant statistics at Somerset House, and I have much pleasure in acknowledging the very great help and friendly interest which were offered by his staff.

The Registrar-General's Figures

The report deals with an estimated mean population of 19,239,700 females. The average annual number

of births was 809,622, and it may be assumed that the number of twins was more than offset by the number of stillbirths which were not registered during the period under review. The number of multiple births is given in the annual report for Scotland, but not in that for England and Wales. In 1930 2557 out of 94,549 births were multiple, or 2·704 per cent. In the same year 4·007 per cent. of the births in England and Wales were stillborn. If it be taken that 4 per cent. of the mothers suffered from the albuminuria of pregnancy and that 5 per cent. of all births were illegitimate, we are left with some 30,800 cases occurring in married women. Of this number it is postulated that 3080 should have subsequently suffered from chronic nephritis, and that in each year* over 2700 previously healthy women should have acquired nephritis simply and solely because they gave birth to children. Yet the average annual number of deaths in females of all ages from that disease during the period under review was only 5637. Moreover, it is fair to point out that antenatal clinics were not widely established during this period. In the Rotunda Hospital reports for the last two years the incidence of albuminuria has been about 30 per cent., and R. E. Tottenham supplies similar figures for Hong-Kong, another centre where antenatal clinics have not been developed. Had the incidence of the albuminuria of pregnancy between the years 1911–1920 been 20 per cent., as it probably was, then 13,500 previously healthy women should have acquired chronic nephritis in each year!

The first important point which emerged from the figures was that the mortality curves from Bright's disease in females have shown the same upward or downward tendencies as those for males in every year except three since they were first recorded in 1861. It is clear from Table I. that the mortality-rates for both

TABLE I

Mean Annual Mortality, per 1,000,000 Living (Standardised), from Acute and Chronic Nephritis, Bright's Disease

	Males.	Females.
1861–70	153	95
1871–80	269	179
1881–90	364	265
1891–1900	418	308
1901–10	435	325
1911–20	406	302

males and females rose sharply in every succeeding decennium until the one under review, in which a fall occurred in those for both sexes. Although part, or all, of this apparent increase may be due to increasing care in death certification and changes in medical opinion as to the importance of kidney lesions, leading to transference from other groups such as "old age," the significant point is that the operation of these factors affected the rates for both sexes in a similar direction.

Secondly, the mortality-rates for Bright's disease vary in different parts of the country, and, as a rule, where they are high for men they are high for women, and conversely where they are low for men they are low for women. It is seen from Table II. and Fig. 1 that if the deaths for the whole country be taken as 100, the deaths in the midlands (an area having a population of nearly one-third of that of the whole country) both for males and females, are represented as 85. London has the highest incidence for males, closely followed by the north, while the figures for females are practically the same in both these areas.

* This figure is arrived at in the following way: 809,622 less 5 per cent. or 40,481 = 769,141; 4 per cent. of this number = 30,766 = the number who had albuminuria, of which 10 per cent. or 3077 had chronic nephritis. 79/89 × 3077 or 2731 represents the number of previously healthy women who acquired chronic nephritis.

It is also clear that, generally speaking, the incidence of Bright's disease is highest in the cities and county boroughs and by far the lowest in the rural districts,

TABLE II

Relative Mortality (Standardised), 1911–1920

BRIGHT'S DISEASE

—	England and Wales.	North.	Midlands.	South.	Wales.	London
Males ..	100	112	85	104	97	121
Females ..	100	116 (121)	85 (85)	97 (70)	104 (197)	115 (55)
COUNTY BOROUGHS						
Males ..	110	123	93	99	108	—
Females ..	107 (97)	122 (109)	91 (79)	87 (85)	98 (148)	—
OTHER URBAN DISTRICTS						
Males ..	99	101	88	98	92	—
Females ..	98 (109)	119 (136)	86 (76)	87 (79)	100 (212)	—
RURAL DISTRICTS						
Males ..	78	76	72	82	95	—
Females ..	83 (118)	89 (145)	76 (103)	81 (83)	109 (197)	—

The death-rates for the whole country are taken as 100. The numbers in parentheses are for puerperal albuminuria and convulsions.

where the incidence of puerperal convulsions and albuminuria is highest. Part of the latter contrast may, however, be due to the fact that death certification in country districts is less precise than in towns.

The annual mortality from Bright's disease among females per 1,000,000 living according to their civil state is shown in Table III. It is evident that the differences between the figures for married and single women are very small, and in the age-group 30–35 the mortality-rate is actually higher in single than in married women, as it is in every age-group after 55. This Table includes a certain number of deaths from chronic nephritis associated with the puerperal state, classified to this cause by the operation of the rules for the selection of one from two or more jointly stated causes of death. The total annual number of deaths in females (the average for the ten years) did not exceed 5640. Even if it be conceded that 10 per cent. of the single women gave birth to children, it is clear that the actual annual number of deaths amongst married women between the ages of 15 and 45 did not greatly exceed the calculated number if they had remained single. While it is possible that

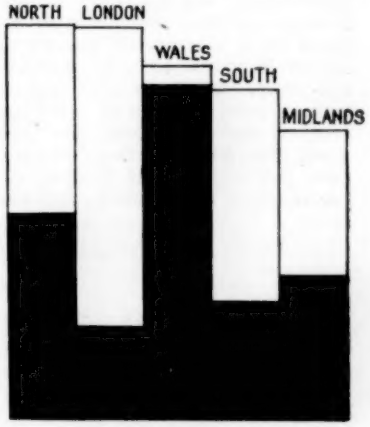

FIG. 1 shows relative mortality (standardised) in women from Bright's disease in different areas. The shaded areas represent (on half the same scale) the relative mortality in the same areas from puerperal albuminuria and convulsions.

TABLE III.—*Annual Mortality among Females per* 1,000,000 *Living in each Group*, 1911–1920

BRIGHT'S DISEASE

Total annual deaths, females, all ages .. 5,637. Total annual deaths, males, all ages .. 6,625.

Age	15–20.	20–25.	25–30.	30–35.	35–40.	40–45.	45–50.	50–55.	55–60.	60–65.	65–70.	70–75.	75–.
Total	40 (69)	57 (95)	78 (125)	112 (171)	183 (262)	272 (351)	427 (470)	592 (546)	822 (621)	1,130 (685)	1,509 (726)	1,895 (647)	2,204 (769)
Single*	40 (68)	56 (69)	74 (51)	113 (46)	166 (50)	255 (59)	398 (74)	569 (82)	830 (91)	1,118 (94)	1,664 (103)	1,946 (87)	2,573 (113)
Married	44 (1)	62 (25)	81 (73)	111 (120)	188 (201)	272 (264)	421 (340)	572 (365)	777 (370)	1,061 (349)	1,401 (291)	1,826 (197)	1,963 (114)
Widows	—	—	—	118 (5)	178 (11)	336 (28)	518 (57)	702 (99)	944 (160)	1,253 (242)	1,569 (331)	1,923 (364)	2,195 (542)

The figures in parentheses give the average annual number of deaths in each age-group.
* Including non-stated.

the protection afforded by the married state might be associated with a low mortality from nephritis if all wives remained barren, it is certainly true that the differences in the mortality-rates between married and single women are so small as to be without marked statistical significance. Supposing only three-quarters of the married women at these ages to have had a child, we should be led, on the basis of the above estimates, to expect at least 3000 per million of them to have contracted chronic nephritis in the process, whereas the excess in the death-rate from this cause does not at any age-group up to 45 exceed 22 per million, and after 55 the excess is on the side of the single women.

Deaths from nephritis may be classified to other categories and to show that there is no such transference as would affect the above contention the mortality-rates in women from cerebral hæmorrhage and diseases of the circulatory system, the latter term including "arterial sclerosis" and "cerebral embolism and thrombosis," are shown in Table IV. In every age-group from 40 onwards—except the last—the mortality-rates from cerebral hæmorrhage are definitely higher in married than in single women. On the other hand, the mortality-rates from diseases of the circulatory system are higher in single than in married women in every age-group. They are also higher in single women from arterial sclerosis in every age-group, and from cerebral embolism and thrombosis in every age-group after 40 except two. It need hardly be stressed that the majority of deaths are certified without post-mortem examination, and that it is not always easy to differentiate clinically between cerebral hæmorrhage and cerebral embolism or thrombosis.

Table V. shows that the death-rate from all causes is higher in spinsters than in married women in all age-groups after 30. One of the most interesting facts of all these Tables is the high mortality amongst widows. It is obvious that they are selected, not on their own merits, but because of the decease of their husbands, and their high mortality-rates—not only from the above diseases but from syphilis and cirrhosis of the liver—suggest that in this group

TABLE V

Mortality of Single, Married, and Widowed Women, aged 15–50, *Compared with all Women (taken as* 100) *from all causes and from all causes less Childbirth*

All causes.				All causes, less all accidents of pregnancy and childbirth.			
Age.	Spinsters.*	Married women.	Widows	Age.	Spinsters.*	Married women.	Widows
15–20	99	178	—	15–20	100	117	—
20–25	95	114	—	20–25	101	96	—
25–30	95	102	205	25–30	104	94	220
30–35	102	98	141	30–35	112	93	152
35–40	102	98	123	35–40	111	95	131
40–45	107	96	127	40–45	111	95	131
45–50	110	94	127	45–50	110	94	127

* Including non-stated.

TABLE IV.—*Annual Mortality among Females per* 1,000,000 *Living in each Group*, 1911–1920

CEREBRAL HÆMORRHAGE

Age-groups ..	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–
Total	7	10	15	32	75	174	403	767	1,230	2,003	3,183	5,310	8,717
Single*	7	9	15	36	74	157	328	616	1,029	1,672	2,931	4,653	8,442
Married	13+	11	15	31	73	174	403	758	1,179	1,855	2,985	4,829	7,544
Widows	—	—	—	44	112	223	537	964	1,5[illegible]	2,399	3,452	5,739	9,042

DISEASES OF THE CIRCULATORY SYSTEM

(This title includes deaths from arterio-sclerosis and cerebral embolism and thrombosis)

Total	294	310	370	471	665	985	1,500	2,310	3,621	5,942	9,543	15,037	24,665
Single*	294	312	378	515	717	1,048	1,542	2,280	3,561	5,743	9,502	14,594	26,239
Married	268	304	361	452	649	949	1,437	2,189	3,403	5,502	8,866	13,825	21,048
Widows	—	—	—	559	691	1,220	1,889	2,889	4,272	6,779	10,221	15,831	25,233

* Including non-stated.

venereal infection, alcoholism, and the physical and mental strain of providing for families, are important factors contributing to a smaller expectation of life.

More than four times the number of deaths occur from Bright's disease in women after the age of 45 than between the ages of 15 and 45. The mortality-rates for males are higher in every age-group. The highest mortality-rate from puerperal convulsions occurs between the ages of 15 and 20, and more than half the deaths occur before the age of 30 (see Table VI.). In the period under review there were

TABLE VI

Annual Mortality among Females per 1,000,000 *Living in each Group*, 1911–1920

PUERPERAL ALBUMINURIA AND CONVULSIONS

Age	15–20.	20–25.	25–30.	30–35.	35–40.	40–45.	45–50.
Total ..	25	80	96	91	75	44	5
Single ..	13	21	13	13	8	5	—
Married ..	896	262	161	123	96	56	7
Widows ..	—	—	—	21	29	11	—

4539 deaths from this cause, 540 occurring in single women.

There is one further factor in the incidence of Bright's disease that is worthy of mention, and that is heredity.

I possess a family chart which shows that of the 9 surviving children of two parents who died from Bright's disease, 5 died from cerebral hæmorrhage, 1 from angina pectoris, 1 from eclampsia, 1 from tuberculosis, while the only surviving daughter has a very high blood pressure. The death attributed to eclampsia should, in all probability, have been recorded as uræmia, for the patient lived for four weeks after her confinement, and the relatives were told that her decease was providential as she could never have recovered her health. Further, of the grandchildren 1 has died from cerebral hæmorrhage, 1 from ? eclampsia, 1 from tuberculosis, 2 have lost an eye (because of high blood pressure), while the lady who gave me the chart has a high blood pressure and "kidney trouble."

Deductions

The figures under review show that Bright's disease is causally associated with environment and heredity, and more intimately and predominantly with age (Fig. 2), a fact which has not been sufficiently appreciated by the authors of the papers to which reference has been made. The facts that for 70 years the mortality curves for women have followed the same upward or downward tendencies as those for men; that in those parts of the country where the mortality is high amongst men it is high amongst women, and conversely where it is low in men it is low in women; that the mortality-rates for Bright's disease are by far the lowest in the rural districts in which those for puerperal albuminuria and convulsions are usually highest; that the mortality curves for Bright's disease in women—for whatever district they are drawn—show no evidence of any considerable additional causal factor operating during the child-bearing period; that the mortality amongst young widows is strikingly high; that there is very little difference between the mortality-rates for married and single women up to the age of 55; these facts all tend to prove that pregnancy and childbirth have but relatively little causal association with chronic nephritis. All that can be said is that there seems to be a slightly higher mortality-rate from Bright's disease in married than in single women between the ages of 20 and 55. If, however, in any year no more than 30 additional deaths had occurred in single, or 70 fewer deaths in married women, and had been suitably distributed between the age-groups from 20 to 55, the mortality-rates for the two classes of women would have been the same. These numbers are of a somewhat different order from 2700.

It might be argued that married women are a selected group and that these figures should be corrected to allow for the fact that the mortality-rates in married women from all causes, less all accidents of pregnancy and childbirth, are lower than

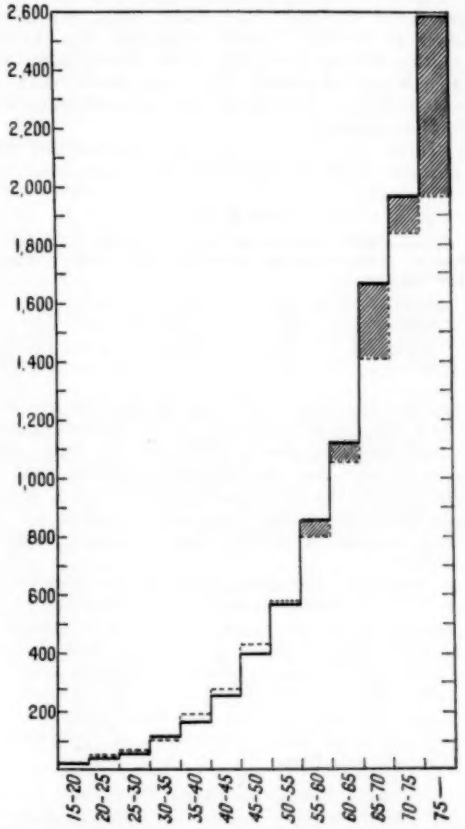

FIG. 2 shows mortality among married and single women per 1,000,000 living. The dotted lines represent the married and the plain lines the single women. The shaded areas represent the amounts by which the mortality in single women exceeded that in married women in the last five age-groups.

those in single women. Even if this argument were allowed the numbers given would only have to be changed from 30 to 35 and from 70 to 81. While, however, it is admitted that marriage is a selective process, and that girls with such diseases as epilepsy are not likely to get married, there is no evidence to suggest either that latent or incipient nephritis in any way affects matrimonial prospects, or that women who remain single are as a group inherently more liable to develop the disease. There can also be no doubt that the accidents of childbirth tend to exact a more heavy toll from the least fit women. For these reasons the above corrections are probably not justified. The main argument of this paper is that the differences in the mortality-rates for chronic nephritis between married and single women during the childbearing period and for 15 years afterwards are so small as to be without marked statistical

significance. It is true that mortality-rates are used as a measure of nephritis incidence, but if "puerperal nephritis" is merely a disability that does not end in death from renal or associated causes, it differs from any other form of nephritis and should be called by a different name.

It can be confidently asserted that the risks of marriage and childbirth are less than those of being a spinster at any age after 30 years, and it would be difficult to maintain that the selection accorded by marriage has much causal relation to this fact. So far as Bright's disease is concerned it causes a considerably higher mortality-rate in single than in married women after the age of 55 years, when the greater number of deaths occurs. Indeed, the marked association of the mortality from this disease with advanced age supports the hypothesis that the associated kidney lesions are more often degenerative than inflammatory.

In Table VII. are shown the standardised rates for chronic nephritis alone in each year from 1921

TABLE VII

The Standardised Death-rates, per 1,000,000 *Living, for Bright's Disease among Females,* 1921–1930. (*Chronic Nephritis only.*†)

1921	197	1926	195
1922	208	1927	213
1923	205	1928	230
1924	195	1929	237
1925	200	1930	234

to 1930 for females. Although the sudden rise from 1926 to 1928 may be accounted for by the introduction of a new form of death certificate in July, 1927, there is at any rate no suggestion, either that the marked fall in the birth-rate,‡ or the recent growth of antenatal clinics has been accompanied by any lessening of the mortality from chronic nephritis in women.

It is, however, necessary to refute the increasingly expansive and almost competitive estimates of the frequency with which chronic nephritis is caused by the so-called toxæmias of pregnancy, both because such views will cause unnecessary anxiety and will inevitably lead to an increase in the number of abortions, and because they will tend to obscure the ætiology both of the "toxæmias of pregnancy" and of Bright's disease.

In conclusion I wish to thank Dr. Percy Stocks, of University College, reader in medical statistics in the University of London, for valuable suggestions embodied in this paper.

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† Table I. includes acute and chronic nephritis under the heading of Bright's disease, whereas Table VII. excludes acute nephritis. Using the same grouping as in Table VII., the standardised figures for 1911–20 would be (according to Reg.-Gen.'s Stat. Review, 1926, p. 99) males 346, females 246.

‡ The average annual number of live births in England and Wales during the decade 1921–30 was 712,907. On the above estimates some 300 less women should have contracted nephritis annually as the result of pregnancy than in the previous decade. Further, in the second half of the decade the average annual number of live births fell to 660,297, so that from 1926 onwards the annual number of women who contracted nephritis as the result of pregnancy should have dropped by over 500 from the calculated figure for the decade 1911–20.

THE GRASS-POLLEN ANTIGEN FOR HAY-FEVER DESENSITISATION

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II.*—DOSAGE

IN discussing the valency of pollen antigens for hay-fever it was cited that really heavy dosing with any grass-pollen would cause the dwindling and disappearance of the diagnostic skin reactions. It was further stated that, when these skin reactions could no longer be produced in a patient, he also lost all trace of his usual hay-fever symptoms at the midsummer hay-fever season.

To take an extreme example: when dealing with an exigent case last year, egged on by the patient, I gradually worked up to a dose of 100,000 units of pollen vaccine—that one final dose representing as much of the yellow pollen grains as will handsomely cover one side of a sixpenny-bit. He got his cure, which was duly signalled by the abolition of his skin reactions; but few patients would go to that degree of trouble—and I may add that with such heroic doses there would hardly be enough pollen extract for all cases.

I wish to show first how this heavy desensitisation can best be carried out; we can then take a side glance at the question of gauging the minimum of such treatment which will give adequate relief—or which will be thought worth while by the average case.

THE COURSE OF TREATMENT

Preliminary cutaneo-reactions.—As with all desensitisation work (whether for grass-pollen, for horse-dandruff, for food-proteins, &c.), we need cutaneo-reactions both to clinch diagnosis and to assess the initial inoculation; but, if diminution or obliteration of the skin reaction is to serve as any test or guarantee of success, we need a reaction base-line to start from.

Any skin or eye reaction that is familiar to the inoculator will serve. I am now using a prick (the minimum prick into the skin of the patient that can be felt as a *distinct* prick) made with a sharp clean needle through neighbouring drops of (1) saline, (2) 5000 units grass-pollen extract, and (3) 50,000 units respectively. The weals (which develop in seven to twelve minutes) can conveniently be traced on to a glass microscope slide the surface of which has been prepared with white-of-egg to take the ink without running. The weals vary from the size of a split pea or less to the size of a shilling or over (see Figure). They are often very irregular in outline with long "pseudopodia." The surrounding erythema is also very characteristic of sensitisation and disappears with treatment, but the rash differs very much on different patients' skins, and is sometimes absent or doubtful even with a well-marked weal; if traced for reference it will of course need a larger piece of glass—say a lantern-slide at the least.

Initial doses.—To save time the initial dose is naturally the highest that can be given without undue reaction in the patient. This must be gauged from the diagnostic weal, from the patient's story of hay-fever symptoms, and from any inoculation treatment in previous years. Initial doses range perhaps from 20 to 100 units, but I have not hesitated to start with as much as 200 units on occasion, and

* Part I. on Polyvalency appeared in our last week's issue.

with much more than that for cases that have been inoculated previously. If the inoculator is nervous of constitutional reaction, a small quantity of adrenaline mixed with the pollen extract in the syringe serves as a safeguard.

Increase of dose by 15 per cent.—Each dose prepares the patient for a larger one to follow, the optimum being the largest that can be taken with comfort. If the initial dose has been under 100 units then it is usual to increase by 20 units at a time up to 200 units, and then to settle down to a 15 per cent. rise at each reinoculation. Thus 200 units would be followed by 230, then 264, 300, 345, 400, 460, 530, &c., right up to say 20,000 units or to a point at which we guess the patient has had enough treatment. If the patient is less sensitive and the initial dose has been 100 or over, then the successive increases on this may be proportionately bolder till the routine 15 per cent. increase is adopted at a dose of 300 or 400 units. The occurrence of reactions after any dose may slow down this increase from time to time, and the absence of any reaction may prompt a bolder increase of dose—say up to 20 per cent.; but it is found that the 15 per cent. rule is convenient in the long run.

Reactions from doses.—If an inoculation is too large the patient may show symptoms such as nettle-rash (either locally, generally, or as angioneurotic œdema), migraine headaches, perhaps asthma, or any of the toxic idiopathies; but unless the dose has been badly over-estimated there will be nothing but a little transient urticaria, which is easily controlled by doses of adrenaline. Even a small urticarial reaction should prompt the inoculator to be cautious for the future, perhaps to repeat the same dose again before increasing, or even, if the reaction was very severe, to go back to a smaller dose.

The sticking-point.—Often, with a stereotyped set of doses as given above, one can completely desensitise a patient without any reaction at all; but sometimes in the course of treatment a "sticking-point" is reached where the patient will not tolerate the usual rate of increase, which has therefore to be slowed down, or possibly even stopped entirely for a dose or two, after which the patient will probably tolerate the inoculations just as readily as previously. As these sticking-points may occur at any place in the gradual ascent of doses, and are in fact just as likely to occur (let us say) at the 200 unit dose as at the 20,000 unit dose, it seems probable that the temporary difficulty lies in the inoculated person; there is, one must suppose, some temporary derangement of metabolism which makes the desensitisation process difficult at that particular time.

Frequency of reinoculation.—The intervals between the doses can be adapted to suit the circumstances of the case within fairly wide limits—e.g., they are preferably not longer than a week nor shorter than four hours. Doses are conveniently given once a day to get through the bulk of the work, but this interval can be stretched out or contracted as convenient. If the inoculation is taking place more rapidly than three times daily it probably saves time to put the patient in a nursing-home or similar institution, and give a regular "rush" course of inoculation.[1]

Number of doses.—It will be readily calculated that if we allow six inoculations for reaching the 200 unit dose, granted there is no hitch, we shall need 19 inoculations to reach the 1000 units, 30 inoculations to reach the 5000 units, 35 inoculations to reach the 10,000 units, and so on. A formidable amount of treatment.

[1] THE LANCET, 1930, i., 744.

SELF-INOCULATION

For the past three summers for heavy immunisation I have been teaching the more intelligent and busy patients to inoculate themselves, otherwise it is often impracticable to get them completely protected. The actual technique for inoculation is easy enough to teach to almost anyone, but the calculation and measuring out of a string of suitable doses is sometimes more than the patient can compass; thus the student type is suitably repaid for its greater intelligence and capacity. Besides being taught what to do, they must be instructed to keep careful records of dates, doses, and any reactions that may occur. If the doctor in charge frequently reviews their "home work," as shown in these reports, he will soon see if patients are fit to inoculate themselves.

AMELIORATION OR CURE?

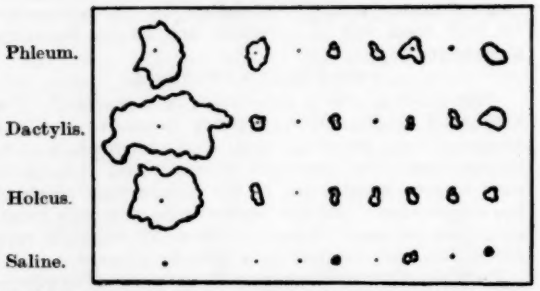
How much of this is practicable as a routine?—The extent of treatment very much depends upon the temperament, determination, and circumstances of the patient. We have the paradox that it is more easy to give satisfaction to the serious cases than to the slight ones; and the patient who demands treatment just because his nose occasionally tickles is very difficult to cure—or convince that he is cured.

Patients differ very much in the amount of improvement they will get from small amounts of treatment. Probably treatment up to 500 units, or even only up to 300 units, will give noticeable amelioration in some cases, and will give what they claim to be a "cure" to a few. There will be increasing amelioration as the dose gets larger. Where the severity of the symptoms really justifies such a course I shall try to get my patients this year up to 10,000 units, with higher desensitisation for special cases—unless the diminishing skin reactions justify the reduction of treatment.

Cutaneo-reactions as a guide to successful desensitisation.—The skin reactions will usually be diminishing at about the 2000 to the 5000 unit dose, and may begin to go much sooner than this; there seem to be great differences between patients here. Reactions will probably disappear between the 5000 and the 20,000 dose; more rarely, however, the reactions do not completely go until a dose of 50,000 or even 100,000 has been given. So far as is known, complete obliteration of the reactions guarantees a complete cure from hay-fever symptoms—for that season at any rate. It seems to be the rule that a patient is noticeably desensitised when the skin reactions begin to wilt under treatment, and this may happen long before they vanish completely. Unless special guarantee of a cure is demanded I would suggest that treatment might be concluded or merely "maintained" when the skin reactions have been noticeably lessened. Even this does not necessarily give sure guidance to the minimum of treatment which will be deemed adequate by the patient; many cases report complete or almost complete relief with very few doses, and, it must be presumed, with little or no diminution of the wealing of the skin; but as these people do not come for subsequent skin testing it is peculiarly difficult to give statistics. I propose to devote this year's cases to investigating that one point.

The bogy of artificial sensitisation.—Frequently in the past, writers have speculated on the dangers of sensitisation following inoculation treatment. Arguing, as I think wrongly, by analogy from anaphylaxy, it

has been suggested or even stated that though inoculations may make a man better for that season perhaps, his last state will be the worse for it because he may subsequently become more sensitive. The facts seem to be dead against this theory. Patients are not more sensitive in subsequent years but very much less so, and we have now had over 20 years of experience of this. Also inoculation treatment, in addition to being less necessary, is subsequently much easier: not only the initial doses but also the subsequent increases can be bolder—much bigger with impunity. Thus the patient needs less and less treatment in succeeding years; this is true over a long period of years with the smaller doses which were previously given, and it is more conspicuously true with the heavy desensitisations I have given in recent years. In fact, judging by the skin reactions, *very* heavy desensitisations may render unnecessary any treatment in the next spring at any rate. For example, if E. F. (see Figure) does not show increasing reactions by the beginning of May she will be advised to go without treatment this year.



E. F. commenced her treatment with 40 units of dactylis pollen on May 3rd (reactions in first column); by May 25th she had reached a 20,000 unit dose of dactylis and her skin reactions (second column) had almost gone. On July 8th, with 50,000 units of dactylis, the reactions had quite disappeared (third column). Treatment was then stopped. The next four columns show the reactions only slightly returning on successive dates in July, September, November, and December, 1932, while the last column was traced on March 14th, 1933. Five other pollens to which she equally lost her reactions have been omitted from this diagram to save space.

Lastly, I may quote the experience of a normal—i.e., non-hay-fever—subject. For experimental purposes—e.g., when demonstrating a Prausnitz reaction—I have frequently injected into myself either subcutaneously or intravenously doses of pollen extract from a minute dose up to 30,000 units, and I can detect no subsequent sensitisation in myself when tested by cutaneo-reactions, or when injecting the next massive dose, or from the atmospheric pollen cloud at midsummer. I have remained normal, and so have my colleagues who have suffered similar treatment. Yet there must be some slight trace of true anaphylaxy from pollen—even in man one must suppose; and it can be readily demonstrated in the guinea-pig which does not experience any trace of true hay-fever so far as we can find out. Therefore in this respect, as in several others, anaphylaxy and hay-fever are in different categories. In practice there is no danger of artificial sensitisation.

CONCLUSION

(1) The practitioner may justifiably tell his hay-fever patient that he *can* be cured for certain; but should add in the next breath that unless symptoms are really exceptionally severe such complete treatment may be hardly worth while. Far less treatment than this usually gives satisfactory or even complete relief, but it is impossible at present to guarantee how much less will do sufficiently well. (2) Some, but at present not enough, evidence as to the successful progress of the desensitisation can be gained from the diminishing skin reactions. (3) There is apparently no danger that the patient may have to pay for present desensitisation by subsequent increased sensitisation.

THE NUTRITION OF THE HEART IN RELATION TO THE ELECTROCARDIOGRAM AND ANGINAL PAIN

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ASSISTANT PHYSICIAN AND PHYSICIAN IN CHARGE OF THE CARDIOGRAPHIC DEPARTMENT, CHARING CROSS HOSPITAL; PHYSICIAN TO OUT-PATIENTS, CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS

It is the purpose of this paper to consider the influence of some nutritional disorders on the heart and the electrocardiogram. The results of an electrocardiographic study of anæmia will be recorded and assessed in the light of the findings I have already published [1] concerning the diabetic heart. It is further intended here to elucidate the principles underlying abnormalities of nutritional type in the electrocardiogram, and to consider how these influence our conceptions of the production of anginal pain.

The problems of general malnutrition of the heart have hitherto received relatively little attention. Advances in cardiological knowledge during the past twenty years have been concerned mainly with the pathology of coronary artery disease and consequent focal myocardial damage, and with the clinical and electrocardiographic counterparts of these morbid processes. Such researches have yielded results of so great importance that they mark an outstanding epoch in the development of cardiological knowledge. But the mechanism of coronary blood-supply and the myocardial lesions due to coronary obstruction constitute only one aspect of the picture. Abnormalities of the irrigating blood in its content of nutritional substances—oxygen, internal secretions, and vitamins—must exert an immense influence, the nature and extent of which still remain problematic. It is true that certain outstanding contributions have already been made to our knowledge of the operation of these factors. The work of Wenckebach [2] on beri-beri heart, and the more recent researches of Harris [3] and others on the arterial changes in experimental hypervitaminosis D, have demonstrated the important influence exerted upon the cardiovascular system by accessory food factors. The control of the heart and circulation by the hormones of the thyroid, adrenal, and pancreas, and the relation of these regulating agents to the vitamins and the nutrition of the heart presents a vast field of research hitherto relatively unexplored.

It was believed in the early days of electrocardiography that for any given subject free from cardiovascular disease the electrocardiogram was constant. While it is now generally appreciated that this is not so, the fact that rapid and gross changes occur in various circumstances in such individuals is not sufficiently recognised. The conditions in which such electrocardiographic abnormalities supervene are, in general, those associated with disturbances of nutrition or with the development of toxæmia. It has long been observed that in such conditions as uræmia and pneumonia, alterations that might

simulate those of cardiac infarction could be seen in the electrocardiogram. Again, to take a nutritional example, it has been shown by McCullough [4] that gross changes in the electrocardiogram occur in the course of malnutrition in infants. Electrocardiographic anomalies belonging to these categories involve, essentially, the T-deflection and the S–T or R–T interval.

Much obscurity still surrounds many of the problems of cardiac nutrition. It has been known for years that glucose administration is sometimes valuable in the treatment of heart disease. Certain observers have recorded the beneficial effects of oral and intravenous administration,[5–7] while Lasch [8] and others have reported negative results. The experiments of MacLean and de Wesselow [9] and Foster [10] have shown that hyperglycæmia following ingestion or injection of glucose may be succeeded by hypoglycæmia, and that repeated doses may produce even more paradoxical results. It may be that these processes underlie the conflicting reports on the value of glucose in the treatment of heart disease and failure. In the sphere of electrocardiography the mechanism of T-wave production is still imperfectly understood. Conditions of local myocardial ischæmia are known to produce certain modifications in the R–T or S–T intervals, and in the T-waves. It has been established that coronary lesions, if they affect the electrocardiogram, produce opposite results in leads I. and III. Thus R–T elevation in lead I. is accompanied by corresponding depression in lead III. if there is any change at all in this lead. The same principle holds, in general, for inversion of the T-wave from a coronary cause. On the other hand, electrocardiographic changes due to parenchymatous damage from toxæmia or nutritional disturbances have sometimes passed unrecognised or have been misunderstood.

NORMAL GLYCOGEN METABOLISM IN THE HEART

Before considering the metabolic basis of malnutrition in the heart, it is necessary to recapitulate briefly present-day knowledge of normal metabolism in the heart. It must be remembered that modern conceptions of these processes are derived very largely by inference from animal experimentation, and from the knowledge that has been gained of skeletal muscle through the work of Fletcher and Hopkins [11] and Hill [12] and others.

It is generally believed that the heart obtains a large part of its energy from the combustion of glycogen. This substance is present in the heart muscle in amounts inversely proportional to its utilisation, as has been shown by Cruickshank and Patterson.[13] The energy of cardiac contractions is provided largely by the breakdown of glycogen into sugar, and sugar into lactic acid. It is believed that about one-fifth of such lactic acid is oxidised to form carbonic acid and water, while the remaining four-fifths are reconverted to glycogen. It is obvious that under all conditions of rest and exercise a balance must eventually be struck between lactic acid formation and disposal. This implies continuous fresh supplies of glycogen, presumably mobilised from the body, and sufficient oxygen to combust a fraction of the lactic acid produced in the course of cardiac contractions. As in every sphere of carbohydrate utilisation, these processes must be under the control of insulin. Hepburn and Latchford [14] have shown that in the isolated perfused heart of the rabbit, addition of insulin to the perfusate produces threefold increase in the glycogen utilisation. Further, it has been demonstrated [13] that glycogen utilisation in the human diabetic heart is only one-half that of the normal heart. It seems probable that insulin also promotes the reconversion of lactic acid into glycogen.

While it has been held in the past that the presence of lactic acid was necessary for the contraction of muscle to take place, it has been proved by Lundsgaard [15] that this is not so, and that muscular contractions may occur in the absence of lactic acid. Lundsgaard's researches were based upon the use of the substance mon-iod-acetic acid which inhibits the production of lactic acid in muscle. The use of this substance has been extended to a study of the mammalian electrocardiogram by Siegel,[16] who has shown that if the production of lactic acid in the heart is inhibited by the use of mon-iod-acetic acid, the T-wave disappears from the electrocardiogram.

THE ELECTROCARDIOGRAM IN DERANGEMENTS OF GLYCOGEN METABOLISM

In a previous publication [1] I have recorded, in collaboration with R. A. Hickling, the results of an electrocardiographic study of the heart in diabetes. Gross abnormalities were observed, ranging from slight depression of the T-waves in lead II. or III. to inversion of the T-waves in all leads. These changes always disappeared in the course of treatment. Reasons were given for believing these electrical phenomena to be due to parenchymatous myocardial damage consequent upon defective nutrition of the heart muscle. Studies by Taterka [17] of patients in diabetic coma yielded corresponding results. Support for the view that nutritional deficiency underlies these electrocardiographic abnormalities is gained from a consideration of the hypoglycæmic state. In this condition also there is a deficiency in the utilisation of glycogen, not, as in hyperglycæmia, because the tissues are unable to use their supplies, but because supplies are not forthcoming. It has been shown by Stepp and Parade,[18] Weichmann,[19] and Middleton and Oatway [20] that depression of the T-waves is commonly found in hypoglycæmia.

It is convenient here to mention some other phases of glycogen metabolism which bear upon this question. Examples of conditions in which enhanced glycogen-utilisation occurs in the body are: (1) exercise, (2) thyrotoxicosis, and (3) excitation of the sympathetic by administration of adrenaline. All of these conditions are found to be associated with well-developed T-waves in the electrocardiogram. It has been shown by Müller and Nicolai,[21] and it is generally agreed, that exercise increases the amplitude of the T-waves. It is still debated how far thyrotoxicosis produces any specific effect upon the electrocardiogram, but White and Aub [22] found a very limited parallelism between the basal metabolic rate and the amplitude of the T-wave in thyroid disease. Siegel [16] states that very steep and high T-waves occur with great regularity in hyperthyroidism. The increased amplitude of the T-wave produced by adrenaline administration has been frequently demonstrated.[23 18]

Reverting to the carbohydrate metabolism of the normal heart already discussed, it is clear that enhanced utilisation of glycogen implies rapid formation of lactic acid, and it has been seen that in such circumstances T-waves of increased amplitude are found. Conversely, both in diabetes and hypoglycæmia, the defective utilisation of glycogen must result in a slowing of the rate of lactic acid formation, while flattened or inverted T-waves are the electrical counterparts of these states. Mention might also be made here of the myocardial disturbances in myxœdema and cretinism, demonstrated by Thacher

and White [24] and Thacher.[25] Depression and inversion of T-waves constantly occurred in these conditions. It seems probable that these changes depended upon reduced basal metabolic rate, slowed carbohydrate metabolism, and reduced production of lactic acid. When thyroid was administered, the electrocardiogram reverted to the normal form, by virtue of enhanced glycogen metabolism. These clinical observations accord concisely with the experimental deductions of Lundsgaard and Siegel that the restitution phase of cardiac systole is related to the T-wave, and that the latter is dependent upon the presence of lactic acid for its development.

MYOCARDIAL ANOXÆMIA

Myocardial ischæmia is, in general, a focal state due to local deficiency in coronary blood-supply. It may be temporary or permanent. Myocardial ischæmia embraces both the condition of anoxæmia and that of deprivation of carbohydrate and all the other constituents of the blood. A state of local pure myocardial anoxæmia is inconceivable. Reference has been made above to the method of analysing by serial electrocardiography one of the nutritional factors of coronary blood-supply—the factor of glycogen utilisation. It is now necessary to consider what changes, if any, may be produced by general myocardial anoxæmia.

Theoretically such a state may be induced either by the various grades of asphyxia brought about by rebreathing or otherwise, or by deficiency in the oxygen-carrying power of the blood. It has been shown by Ward and Wright [26] that lowering or flattening of the T-wave in lead II. accompany nitrous oxide anæsthesia. Since these changes did not occur if oxygen were simultaneously administered, it was inferred that they were due to acute myocardial anoxæmia. The effects of extreme oxygen-want upon the human electrocardiogram have also been demonstrated by Greene and Gilbert.[27] They showed that when the phase of loss of muscular control and unconsciousness was approaching, the T-wave decreased in amplitude, becoming ultimately diphasic or negative. It is clear that the conditions existing in both these experiments on acute anoxæmia do not naturally occur except as premortal states.

It might be expected that a study of high-grade anæmia would reveal the influence upon the myocardium of chronic anoxæmia. A search of the literature has disclosed no systematic investigation of this kind. Reid [28] has taken single electrocardiograms in a series of 20 patients suffering from pernicious anæmia, but found no abnormality in them. On the other hand, Coombs [29] has suggested that there is evidence of certain electrocardiographic abnormalities in pernicious anæmia.

The oxygen-carrying power of the blood is commonly reduced to about one-fourth of the normal in patients with severe anæmia. The pathological counterpart of this is a fatty change in the myocardium, together with hypertrophy, as shown by Cabot and Richardson.[30] The fatty change in pernicious anæmia is one of the outstanding morbid changes present. It is reasonable therefore to suppose that if oxygen is, as is commonly supposed, the most important constituent of coronary blood, some electrocardiographic changes might be found in states of profound anæmia. That the myocardium is not starved of oxygen to the extent suggested by the hæmoglobin content in states of anæmia has been shown by Fahr and Ronzone,[31] who have demonstrated the existence of an elaborate compensatory mechanism. This consists essentially in a doubling of the minute volume of the heart, and an increased blood velocity due partly to a halving of the viscosity of the blood. At the same time, the coronary circulation is augmented to a degree corresponding to strenuous effort. Starling [32] has emphasised the fact that in anæmia the heart is able to extract oxygen more completely from the blood. From these facts it may be deduced that myocardial oxygen-lack may well occur in anæmia, unless the patient is at rest. Fahr and Ronzone claim that they have adduced "very good support for the view that the heart muscle changes in pernicious anæmia are due to lack of oxygen."

SUCCESSIVE ELECTROCARDIOGRAMS IN HIGH-GRADE ANÆMIA

During the past year I have taken serial electrocardiograms in 15 patients recovering from severe anæmia. These have shown neither characteristic changes nor progressive alterations of any sort in any phase of the deflections. In this investigation the experimental group excluded cases of anæmia due to new growth, leukæmia, and other fatal diseases. It included pernicious anæmia and several varieties of hypochromic anæmia, such as acute and chronic hæmorrhagic anæmias, simple achlorhydric anæmia, and the Plummer-Vinson syndrome. In most cases an electrocardiogram was taken soon after admission to hospital, but before any specific treatment was begun. Further records were made at intervals of about a fortnight until the blood count had returned to normal. Thereafter only one or two records were taken at intervals of some months. The usual precautions regarding the posture of the patient and standardisation were taken to ensure the comparability of successive electrocardiograms. The ages of the patients ranged from 15 to 70, and the previous duration of the anæmia varied from one week to many months.

The results of this investigation of the myocardial function in anæmia provide a striking contrast to those derived from a study of diabetes. In anæmia there is sufficient deprivation of oxygen to induce the typical fatty changes in the heart muscle, and yet no derangement of the normal electrical processes can be discovered. On the other hand, the metabolic abnormality of defective glycogen utilisation produces very striking electrical disturbances, while no corresponding pathological change in the myocardium is discernible unless the patient has died in coma.[33 34] The inference is that the maintenance of sufficient carbohydrate combustion in the heart muscle is at least as important, if not more important, than the provision of a fully adequate oxygen-supply. Moreover, these fundamental processes are not directly dependent upon each other, since lactic acid may be produced from glycogen anaerobically, while the essential function of oxygen is the combustion of a fraction of the lactic acid formed. Prolonged inadequacy of oxygen-supply appears to be of little moment in terms of maintenance of the circulation; many patients with high-grade primary anæmia suffer but little disability, and are commonly reluctant to give up work and take to bed. Again, frequent blood-pressure measurements in several of my patients suffering from severe anæmia (other than acute hæmorrhagic) revealed no progressive increase. Turning once more to the circulatory condition in diabetes, it is well known and readily demonstrated that the blood pressure is lowered in severe cases, regaining normal levels during stabilisation. The fall in pressure is so great in coma that many regard it as a contributory cause of death in this state.

ANGINAL PAIN

It is necessary now to consider how these conceptions of the glycogen metabolism of the heart and the nutritional and toxic modifications of the electrocardiogram bear upon the problems of anginal pain. It is understood that this discussion relates to anginal pain as a symptom, and is not concerned essentially with the syndrome of angina pectoris. There is no occasion here to labour the evidences which have shown conclusively that anginal pain is, in general, due to myocardial ischæmia. It has been seen above how numerous and varied are the deprivations involved in myocardial ischæmia. It is widely assumed that of these deficiencies anoxæmia is the causal factor in anginal pain. A notable exposition of this view has been developed by Keefer and Resnik.[35]

Experiments upon human voluntary muscle by Sir Thomas Lewis[36] have led him to infer that myocardial anoxæmia is not the direct cause of anginal pain. He came to the conclusion that such pain must have a physico-chemical or chemical origin, and must be attributable to a change in the conditions in the tissue spaces outside the muscle-fibres. On the basis of this view it follows that the avoidance of pain in muscle depends upon adequate irrigation with blood, which removes the pain-producing substance, thereby preventing its accumulation in sufficient amount to cause pain.

But while oxygen-lack may not be the precipitating cause of anginal pain, it may be that deficiency of oxygen in the irrigating blood conduces to the physico-chemical state that is the concomitant of pain. In fact, the following clinical considerations show that such is probably the case. It is well known that anginal pain is experienced fairly commonly, perhaps in a twelfth of all patients with pernicious anæmia.[29 37 38] It has already been mentioned that in this disease the coronary blood flow is immensely augmented, while a liability to pure general myocardial anoxæmia exists. The factor of irrigation is here more than adequate, while the factor of oxygen deficiency is brought out by effort which precipitates anginal pain in these patients. Further, such patients are not uncommonly of an age at which coronary changes would not be expected. One of my patients, aged 37, attended the out-patient department with an obvious and confirmed pernicious anæmia. He had 30 per cent. hæmoglobin and he complained among other symptoms of severe midsternal pain on climbing stairs or hurrying. Careful investigation revealed no physical signs or electrocardiographic evidence of cardiovascular disease in this patient.

But apart from the mechanical factor of irrigation and the question of anoxæmia, the sugar supply to the heart must be taken into account. There can be no doubt that pure deficiency in blood-sugar may precipitate anginal pain. It may well be that this factor operates in any local ischæmia, but in such a case it is impossible to separate its effect from the accompanying restriction in oxygen-supply. However, in hypoglycæmia, while no anoxæmia occurs, sugar supplies fall to a low level and not uncommonly anginal pain appears. This phenomenon has been termed by Parsonnet and Hyman[39] "insulin angina."

The frequency of anginal syndromes in diabetes is unquestionably due essentially to the severity of the coronary changes that constantly accompany this metabolic disorder. But according to Levine[40] the patient suffering from coronary disease and diabetes is in greater danger of coronary seizures than the patient suffering from uncomplicated coronary sclerosis. It is a common clinical experience that anginal syndromes occur in diabetics usually at times when metabolic equilibrium is temporarily lost. These facts suggest that although a permanent local ischæmia due to coronary disease underlies such attacks, the precipitating factor is probably an exacerbation of the nutritional disorder. The view that defective glycogen metabolism is a factor not only in the production of angina in the diabetic, but also of anginal pain in general, derives support from the value of insulin in the treatment of angina pectoris. During the past year I have treated certain selected sufferers from intractable angina pectoris with insulin and glucose, without in any additional way modifying their régime. Striking improvement has occurred in each case. In the future publication of these results reasons will be given for the belief that the benefit conferred by insulin is attributable to the promotion of glycogen metabolism.

CONCLUSION AND SUMMARY

The electrocardiographic abnormalities occurring in coronary lesions offer a sharp contrast to those appearing in nutritional or toxic disturbances of the myocardium. Mention has already been made of the principle that coronary lesions cause changes principally in the S–T or R–T intervals and the T-waves, opposite effects being produced in leads I. and III. Such changes may be regarded as "localising" and relating to focal myocardial changes. On the other hand, the changes in diabetes, myxœdema, malnutrition in children, acute anoxæmia, starvation in dogs, hypoglycæmia, and other general parenchymatous defects in the heart are always in the direction of flattening or inversion of the T-wave or depression of the R–T interval, whether one or all leads are affected. These changes represent diffuse parenchymatous myocardial damage. That they are referable to defective glycogen metabolism and diminished production of lactic acid in the heart is the explanation which at the present time appears best to explain the known facts. An electrocardiographic study of severe anæmia shows that in general myocardial anoxæmia, although pathological changes are often present, no corresponding abnormalities in the electrocardiogram can be demonstrated.

From the arguments and facts presented, it appears that a liability to anginal pain may be present when there is enhanced glycogen utilisation in the heart, but only if the arterial irrigation of the heart falls short, or if insufficient oxygen is present to combust the lactic acid and other metabolites that are present. An obvious example is the anginal pain arising during effort, when local coronary sclerosis or spasm exists. The precipitation of anginal pain by the administration of adrenaline or thyroid, or in the course of thyrotoxicosis, depends essentially upon the augmentation of the rate and force of the heart, lactic acid being rapidly formed, while the coexistence of coronary sclerosis with inadequate irrigation allows it to accumulate. Again, in severe anæmia, enhanced glycogen utilisation in the heart is accompanied by general anoxæmia, the latter being responsible for slow destruction of lactic acid, while the coronary arteries, and therefore the factor of irrigation, may be normal. It is not suggested that lactic acid is the pain-producing substance, but it seems likely that accumulation of the former is proportional to the concentration of the latter.

Liability to anginal pain also attends certain conditions in which there is perversion of metabolism in the heart as part of a general metabolic dyscrasia. Here the precipitation of pain is the direct consequence

of defective glycogen metabolism. Although coronary lesions not infrequently complicate the states of hyperglycæmia and hypoglycæmia, there appears to be no doubt that pure metabolic derangements of this type may induce anginal pain.

To my medical colleagues of the staff of Charing Cross Hospital, who have allowed me to investigate patients under their care, and specially to Dr. Hickling, who has given also valuable criticism, I tender my thanks. Towards the expenses of this research a grant was made by the British Medical Association.

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Clinical and Laboratory Notes

AIR EMBOLISM DURING ARTIFICIAL PNEUMOTHORAX INSUFFLATION

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THE following case is of interest in view of the fairly definite nature of the accident, the dramatic sequence of clinical symptoms, and the rapid and uneventful recovery.

A man, aged 20 years, was admitted to the Cheshire Joint Sanatorium on Dec. 12th, 1932, with a history of recent onset of morning cough and sputum. He had had one slight hæmoptysis and some loss of weight. The sputum contained tubercle bacilli, and physical and radiological examination showed an active exudative lesion of upper half of right lung, with an appearance of recent cavity in right infra-clavicular area and some lesser deposits at the left apex.

Right artificial pneumothorax was performed on Jan. 11th, 1933, and successive refills were:—

Date.	Manometer readings—		Amount of air given.
	Initial.	Final.	
Jan. 11th, 1933	− 7 −5	+1 +14	300 c.cm.
„ 12th, „	−11 −5	+5 +11	300 „
„ 14th, „	− 5 −2	+1 +14	350 „
„ 17th, „	− 8 −3	−2 + 6	300 „
„ 21st, „	−10 −5	−3 + 1	300 „

The readings, though not very satisfactory, appeared to show the possibility of an increasingly efficient collapse.

On Jan. 26th fluoroscopy showed a narrow vertical collapse of the lower two-thirds of the right lung with flattening of the diaphragm. Three attempts at pleural puncture gave equivocal manometer readings, and the case was referred to Dr. Peter W. Edwards, the medical superintendent, who made a final attempt. A free manometer swing (about −3 + 2) was found, and a small experimental insufflation was attempted. Within a few moments the patient became extremely restless, and the needle was at once withdrawn. The patient's colour then became poor and the expression anxious, followed quickly by partial loss of consciousness, convulsive movements, clonic spasms of limbs, and conjugate deviation of eyes to the right. There was no loss of sphincter control, and no respiratory signs.

A few moments' later multiple circular areas of blanching, with bright circumferential injection, each 1 in. to 2 in. in diameter, were noticed over two areas of skin—(1) the radial aspect of the right forearm from elbow to fingers, and (2) the submammary region of the right chest wall.

Consciousness was quickly regained and speech recovered, the conjugate deviation persisting somewhat longer. There was then noted definite laxity of the left arm and left leg with loss of voluntary movement, exaggeration of deep reflexes on affected side, and ankle-clonus with extensor plantar response. The skin areas quickly changed to an ashy grey colour with surrounding dusky injection, and finally to a diffuse dusky marbling. The paretic signs passed off within about 20 minutes, and the plantar response became flexor. The skin marbling persisted for about an hour, and there was some residual pallor, general weakness, and diffuse headache, passing off within 24 hours.

This case was clearly one of multiple air emboli affecting the terminal distribution of the right internal carotid, right brachial, and (probably) right internal mammary arteries. The left hemiparesis indicated interruption of conduction probably in the region of the internal capsule, and the irritative symptoms probably showed some additional cortical distribution of air. The amount of air passing from the pulmonary venous system to the systematic circulation must have been several cubic centimetres, and its distribution being confined to the terminal circulation of the innominate artery had a clear physical explanation through the patient being in the left lateral position for insufflation. The entry of the air into the pulmonary venous system despite the manometer swing, which must have been alveolar, was probably due to the positive water pressure of the apparatus causing air to enter an injured vein from the alveoli. The happy termination of the accident indicated non-involvement of the blood-supply of the vital centres of the medulla, and the rapid subsidence of symptoms showed the quick absorption of the embolic air by the circulation—presumably more rapid in the freer cerebral circulation than the skin—while the rapidity of progress demonstrated the uselessness of any active treatment.

Cases of air embolism both cerebral and cutaneous are freely described in the literature of pneumothorax therapy, but this case is of considerable interest in the combination of symptoms. This case was the first suggestion of air embolism occurring among a long series of artificial pneumothorax cases in the records of the sanatorium. Such cases are stated to "truly

belong to the historical period of pneumothorax therapy"[1] which may account for their non-publication in more recent years.

I have to thank Dr. Edwards for permission to publish the above case.

SPONTANEOUS SUBARACHNOID HÆMORRHAGE

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A man, aged 46, was admitted to the Macclesfield General Infirmary on Jan. 2nd, 1933, in a semi-comatose condition suffering from intense occipital headache and nuchal rigidity.

History.—The patient suffered from a "nervous breakdown" nine years ago, characterised by the gradual onset of severe occipital headache, with pain in the back of the neck and general weakness. On this occasion he remained in bed at home for two weeks, recovery was slow, and he did not resume work for two months. Since then he has been subject to attacks of severe bilateral, frontal, and occipital headache, "neuritis of the neck," and vomiting, suggesting a "cerebral" type of migraine.

On Dec. 31st, 1932, whilst working in the garden, he suddenly complained of intense pain in the head, vomited, and collapsed, and remained in an unconscious condition for several hours. The next day he was confined to bed, and was admitted on the following day.

On *admission* he was in a very drowsy condition, with a hand clasped to the forehead, and complained of intense headache. Questions evoked a response only after some delay. Pulse-rate 60, temperature 99° F. There was definite rigidity of the neck muscles, but Kernig's sign was negative, tendon reflexes normal. The pupils were small and gave a transient contraction to light. Fields of vision normal, and no papilloedema or ocular paresis was present. Nothing abnormal was found in the chest or abdomen.

Special investigations.—Urine normal. A lumbar puncture was performed on Jan. 4th, and two specimens were taken, which were uniformly blood-stained, and on centrifugalisation gave a clear yellow supernatant fluid with a heavy deposit of red blood-cells. No other investigations on the fluid were made. Wassermann reaction negative. Blood pressure 150 systolic, 95 diastolic.

Course of illness.—With symptomatic treatment the patient remained in much the same condition for two weeks. The lumbar puncture relieved the symptoms for some hours. Gradual improvement then took place, the ocular symptoms clearing up after some days, the headache became less intense, but the nuchal rigidity persisted. A second lumbar puncture performed on Jan. 18th showed transparent fluid of a brownish-pink colour, containing no coagula, 190 red cells, and 80 leucocytes per c.mm. The supernatant fluid retained its pink colour, and the deposit showed many erythrocytes showing crenation and other evidence of disintegration. Polymorphonuclears and mononuclears were present in equal numbers. Globulin tests were strongly positive. A culture remained sterile.

The patient was discharged free from symptoms on Feb. 4th, 1933.

This case is of interest owing to its close similarity to the case reported by Dr. Maurice E. Shaw in The Lancet of Jan. 21st (p. 138), where the patient, having improved steadily after a severe hæmorrhage, eventually became suddenly unconscious and died after another hæmorrhage. At the post-mortem examination a ruptured congenital intracranial aneurysm was found in close relation to the circle of Willis. A similar diagnosis can be made with certainty in this case. The "neuritis" of the neck and occipital headache which were present before admission may possibly be explained by leaking of the aneurysm, causing clots about the nerve-roots of the medulla and cervical cord, with an eventual severe hæmorrhage producing coma.

The ocular symptoms suggest irritation of the third cranial nerve, rather than paralysis. The cerebro-spinal fluid taken at the second lumbar puncture showing absence of any undegenerated blood-cells made it clear that the hæmorrhage had ceased, and that complete recovery would ensue if there was no further hæmorrhage.

[1] Burrell, L. S. T.: Recent Advances in Tuberculosis, London, 1929.

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE

SECTIONS OF NEUROLOGY AND PHYSICAL MEDICINE

At a joint meeting of these sections on March 16th, with Dr. Risien Russell, president of the section of neurology, in the chair, a discussion on the causation and treatment of

Interstitial Neuritis

was opened by Dr. Wilfred Harris. The term was used, he said, to describe an acute or chronic inflammation of the supporting connective tissue binding together the separate nerve-fibres. The nerve-fibres were liable to be compressed and damaged by such inflammation. Neuritis might have a toxic origin from alcohol or diabetes—in which case both interstitial and parenchymatous nerve degeneration might occur—or it might follow certain fevers, such as paratyphoid, or the more chronic infection of dental sepsis or other distant suppuration. Another group of cases were due to the local spread of neighbouring inflammation, as in tuberculous caries, or the more chronic condition of fibrositis of the shoulder and back muscles, involving the finer nerves and nerve-endings and causing the pains of so-called muscular rheumatism and lumbago. Spread of such a chronic inflammatory process might involve the sheath of the sciatic nerve at the notch, producing sciatica; and fibrositis of the neck muscles might give rise to brachial neuritis by affecting the brachial plexus. A rheumatic or osteo-arthritic process involving the spinal nerves at the intervertebral foramina gave rise to an obstinate form of sciatica with contralateral scoliosis, the trunk being flexed laterally away from the painful side. Osteo-arthritis of the hip-joint might also cause some sciatica by direct spread of a chronic inflammation to the sheath of the nerve, which passed close behind the joint. Chill might be a predisposing factor in neuritis, for example in facial palsy; and direct injury from contusion and bruising might produce the same result.

Treatment differed in the acute and the chronic stages and might be medicinal or physical. Rest was important in the acute stage, and opiates might be necessary to relieve pain. Strychnine and other tonics were valuable in the convalescent stage of acute neuritis when pain and tenderness had disappeared, but arsenic and alcohol should be avoided since both could cause neuritis. Iodine was of value in the chronic conditions, and massage was usually borne before either electrical treatment or strychnine. Antiphlogistine, mud packs, hot saline baths, and radiant heat had a place in treatment, but he had obtained little success with diathermy; liniments alternating with poultices were often useful. In long-standing sciatica the nerve was shrunken and cord-like; longitudinal stretching was useless, except in a few cases, but lateral stretching could be produced

by injecting 80–100 c.cm. of saline into the nerve. In the high type of sciatica saline could be injected paravertebrally. Acupuncture was sometimes successful even though probably not one needle in ten actually pierced the nerve.

Dr. M. B. RAY pointed out that the delicate areolar tissue which bound the nerve-fibres together, the capsules of joints and the fascial sheaths of the muscles formed a unified connective tissue system, which should be considered as a single organ. The type of patient who developed neuritis often showed signs of inadequacy of the endocrine sympathetic system as indicated by intolerance to cold and a dry inactive skin. Moreover, such patients were frequently maladjusted to their environment; one of his patients claimed that her attacks of brachial neuritis developed whenever she was worried. Rest was important in treatment, and patients with sciatica might be put on a long Liston splint. Sedatives, including laudanum, might be necessary in the early stages. Moist heat gave more relief than dry heat, especially when used in the form of mud packs. He had found that six or seven coats of melted paraffin wax, applied over the affected area with a brush and left in place for half an hour, promoted sweating, and was usually beneficial. In lumbago, sweating across the back was often the first sign that the condition was going to clear up. Any form of bath which promoted sweating was useful in the treatment of neuritis and he had found diathermy helpful in the *later* stages. Massage in the early stages was a mistake. He had seen good results from saline injections and also from the injection of oxygen round the nerve sheath; the gas caused ballooning of the limb and formed a natural cushion. Acupuncture gave the patient the feeling that something was being done to help him.

Dr. J. P. MARTIN said that he had recently had the opportunity of studying the pathology of the condition. There was exudate, probably sero-fibrinous in character, beneath the epineurium, and also between the lamellæ of the perineurium; œdema of the perineurium caused pressure on the nerve-fibres. It was not easy to see why this should cause pain; in Saturday-night palsy, where there was direct pressure on nerve-fibres, there was no pain. Probably direct pressure affected only the main nerve-fibres, while neuritis involved the nerve-endings of the nervi nervorum. Paralysis as a result of neuritis was uncommon in the large nerve trunks, but was relatively common in neuritis of the facial and long thoracic nerves. In sciatica there was often some degree of paralysis, indicated by wasting, fibrillation, and loss of the ankle-jerk. Interstitial neuritis affecting one spinal root was sometimes seen, and the fifth cervical appeared to be more commonly affected than others; recovery was often more rapid than from a parenchymatous neuritis of the same nerve-root. He agreed that radiant heat was more valuable than diathermy in treatment. The amount of exudate present suggested that acupuncture might be a useful form of treatment. He had used injections successfully, but in one case where he had used a solution of antipyrin, hæmaturia had followed, so that now he used only saline and a very little novocain. Where fibrositis was present, oxygen injection might separate inflamed surfaces and so relieve pain.

Dr. J. BARNES BURT discussed the so-called rheumatic group of cases of interstitial neuritis. Gowers and Osler, he said, considered the majority of these cases to be due to interstitial neuritis, but most of them were seen before changes in the nerves had occurred. The condition was generally secondary to arthritis, bursitis, or fibrositis of neighbouring structures. The great occipital nerve was one of the few nerves which pierced a muscle; inflammation might spread from the muscle into the nerve, giving rise to persistent rheumatic headache; massage of the trapezius would quickly relieve the condition. Brachial neuritis associated with shiny skin and contractures was nearly always due to arthritis of the intervertebral joints; it might be the result of trauma, induced, for example, by a faulty golf stroke. Pain in the arm might also be due to subacromial bursitis, with inflammation spreading into the musculo-spiral nerve, and another cause of pain was fibrositis of the supraspinatus muscle, leading to compression of the supraspinatus nerve against the bone, and pain referred down the median nerve. He classified cases of sciatica into root, trunk, and referred cases. The commonest cause of root sciatica was some form of arthritis of the lumbar vertebræ. Trunk sciatica was often associated with fibrositis of the gluteus maximus or the fascia covering it. Longitudinal stretching of the nerve was only helpful in this group of cases where there might be adhesions between the nerve and the fascia. Referred sciatica might be associated with fibrositis of the gluteus medius; the swollen muscle-fibres pressed the nerve against the bone. He advised a visit to a spa for treatment; deep baths, mud packs, and the undercurrent douche were all helpful. Massage was in bad repute because the doctor usually failed to write out a prescription for massage as he would for drugs.

Sir ROBERT WOODS agreed that the two essentials in the treatment of neuritis were rest and warmth, but he did not think a long Liston splint necessary in cases of sciatica. In discussing the pressure of interstitial exudate as a cause of pain, he pointed out that injury produced ionic disturbances in a nerve; was it not possible that prolonged pressure gave rise to similar ionic changes causing pain?

Dr. D. E. DENNY-BROWN had a case of disseminated sclerosis in which sciatica had occurred independently. The patient had died suddenly, for no ascertainable reason, following an injection of oxygen round the nerve; a previous injection of oxygen given some months before had been followed by relief of pain and no untoward effects. Section of the affected nerve showed œdema and engorgement of the blood-vessels. The nerve fasciculi were large, and there was œdema under the perineurium, sometimes spreading right round a nerve bundle. Longitudinal section showed the perineurium to be separated from the nerve bundle; proliferating endothelial cells could be seen in the interval. Damage to the nervi nervorum by pressure was the probable cause of pain.

Dr. GORDON HOLMES said that there were really two separate conditions under discussion: true interstitial neuritis, and referred pain along a nerve due to inflammation in neighbouring tissues. In rheumatic headache there were nodules to be felt in the muscles at the back of the neck; the pain was not referred merely to the distribution of the great occipital nerve, and the condition could be cured by massage in three days. This was not an interstitial neuritis. Brachial neuritis was a rare condition; most of the cases of pain in the arm were due to subacromial bursitis, or to changes in the shoulder-joint and the muscles round it. Pain might be due to pressure on the nerve, without neuritis or structural changes being found in the nerve itself. In cases diagnosed as sciatica, changes in the hip-joint or

gluteus maximus might give rise to pain not associated with changes in the nerve. True sciatica might be of the high type or of the low, or trunk, type. In the high type there was an increase of cells and protein in the cerebro-spinal fluid, which could only be due to changes in the intrathecal portions of the roots. In main trunk sciatica the lesion was in the region of the notch. It was never wise to give a prognosis as regards time in cases of sciatica. Rest was essential, and injections were useful in many cases; the fluid should be injected under pressure into or round the nerve. No true sciatica should be given massage. Spa treatment was excellent, until the patient began to improve, when massage was given, and the trouble began again.

SECTION OF RADIOLOGY

AT a meeting of this section on March 17th, Dr. RUSSELL J. REYNOLDS, the president of the section, being in the chair, Mr. R. WATSON JONES read a paper by himself and Dr. R. E. ROBERTS on

Pathological Calcification and Ossification

in relation to the theory of Leriche and Policard. He said that radiologists had long been familiar with the "atrophic bone changes" seen as a sequel to trauma or in the presence of infection, and had noticed increased density or sclerosis of the bones in syphilitic periostitis, chronic osteitis, Paget's disease, and other lesions of like character. Ossification had been recognised in subperiosteal hæmatoma and tendinous attachments; there was a recognised relationship between the blood-supply and the occurrence of calcification.

In 1926 Leriche and Policard enunciated a theory which, they claimed, explained decalcification, calcification, and ossification of all types. The theory was based on the view that the early undifferentiated mesenchyme of the embryo formed a common mesoblastic stem from which fibrous tissue or cartilage or bone could develop, and that these tissues could only be converted into each other by a preliminary reversion to this undifferentiated tissue. The important function of the bone cells was the absorption and mobilisation of calcium, a process known as "halisteresis." This was stimulated by increased arterial blood-supply, and was reduced, or suspended, by a reduction in blood-supply. They held that there was a definite relationship between vascularity and calcification of bone, that if the supply of blood to a bone was increased, decalcification took place, while if that supply was diminishing, sclerosis occurred in the bone. There could occur a "relative" hyperæmia from disuse, the blood-supply to the bone being, in such case, in excess of the functional requirement. If, as in a sequestrum, the blood-supply was completely shut off, no change occurred in the calcium content of this bony fragment. Deposition of calcium in connective tissues of low metabolism could occur if the blood-supply to these tissues was diminished, as in trauma, infection, or degeneration, but in such cases calcification was not inevitable. In the presence of fibroblasts the only requirements for the development of bone were: (*a*) an adequate local blood-supply; (*b*) an excess of calcium. Pathological calcareous deposits in any region of the body might change into pathological ossific deposits. As long as the causal ischæmia persisted the calcium deposit would remain a non-living mass of amorphous calcium carbonate and phosphate; but if an adequate hyperæmia supervened, then the factors favourable to new bone formation were present.

In a whitlow the degree of decalcification might be so marked that a radiogram might lead to its being mistaken for necrosis, though subsequent regeneration showed that most of the translucency was the result merely of decalcification, not of destruction. The puzzling cases in which the head of the femur or humerus seemed to have been completely destroyed, though the bones retained their normal position and subsequently regenerated, could now be considered examples of hyperæmic decalcification due to joint infection in which there was little destruction. Kümmell's disease of the spine could also be satisfactorily explained on the basis of traumatic hyperæmic decalcification.

An important type of hyperæmic decalcification was that sometimes affecting the atlas in inflammatory and other lesions of tonsils, pharynx, or cervical glands. Also, cases had been observed of regeneration of apparently extensively destroyed bone in the vicinity of sarcomata. These growths possessed the power of inciting vascularisation of the neighbouring tissues; hence this apparent bone destruction could be attributed to hyperæmic decalcification. The degree of traumatic hyperæmic decalcification varied with the degree of disuse resulting from treatment. Sometimes in cases of injury the fragment looked dense in comparison with the neighbouring parts, but this was only apparent. The portion stood out on account of the surrounding hyperæmic decalcification; the blood-supply to it had been cut off leaving it avascular. This was well illustrated in the sequestrum of osteomyelitis, but was not so often recognised in carpal and tarsal injuries.

Pathological calcification invariably occurred in tissues derived from the common mesoblastic stem; in other words, bone, cartilage, or fibrous tissue. These calcifications only took place as a result of diminished blood-supply, lowered mostly by trauma or infection. Therefore calcifications could occur in the following situations: intervertebral discs and semilunar cartilages; old tuberculous foci; old abscess cavities; the walls of parasitic cysts; in tendons; in dura mater and falx cerebri; in walls of sclerotic arteries; in the heart after fibrous myocarditis; in the pericardium after adhesive pericarditis; in subcutaneous tissues in Raynaud's disease; in the thrombi of hæmangiomata; in such simple tumours as degenerating fibromata and lipomata. But calcification was not the inevitable sequel of fibrosis of an avascular connective tissue, otherwise pathological calcification would be much more common than was the case. In general, ossification denoted life and strength, while calcification in bones indicated diminished vitality and weakness.

With regard to pathological ossification, on this theory of Leriche and Policard it seemed that in the presence of fibroblasts only two requirements were essential for the formation of bone: a plentiful supply of calcium, an adequate blood-supply. Given these, any mass of undifferentiated mesenchyme could become ossified. The common positions of calcification were the sites of heterotopic bone formation. In Paget's disease a series of changes could be seen to be taking place simultaneously; while in subperiosteal hæmatoma there was obviously a huge store of calcium readily available. And ossifications could take place in the region of joints, especially the elbow.

Mr. Watson Jones and Dr. Roberts considered that the theories of Leriche and Policard were sound, but it still remained to be shown what factors decided

whether a connective tissue with lowered metabolism and reduced blood-supply should become the site of calcification.

DISCUSSION

Mr. DUNCAN FITZWILLIAMS referred with appreciation to the work of D. M. Greig, of Edinburgh, on the subject under discussion and said that the views expressed seemed to be a development of those sketched out by Greig.

The PRESIDENT said that it was common to find that patients who had to remain in bed for a long time because of accident had renal calculi; a number of patients with spinal caries had developed calculi. Reference had been made to calcification following injections of lead; he had seen calcification take place following deep X ray therapy, no injections having been given.

Dr. J. F. BRAILSFORD said that in cases of injury to the wrist-joint a radiogram taken immediately after the accident sometimes revealed not even slight evidence of a lesion. He had such a case under his care at present; but a month afterwards X rays showed a cyst inside the scaphoid, and a few weeks later still there was evidence of a fracture. In osteochondritis the first phenomenon seen was an increased density of bone; then there was a gradual crumbling and islands of condensation became apparent. If the patient was watched carefully evidence could be detected that areas of new bone were being laid down, of equal density to contiguous bone.

Dr. C. THURSTAN HOLLAND said that during the war he had seen many cases among severely wounded soldiers of stones in the kidneys due to lack of movement and exercise; but as soon as the men were able to get about again and resume their activities the stones disappeared in a few weeks.

Prof. J. M. WOODBURN MORISON said he had not been studying in Edinburgh many weeks before Greig showed him that his ideas on bone pathology must be revised; one thing on which Greig insisted was that the term myositis ossificans should not be used, and he had also written on the formation of intracranial osteophytes. Prof. Woodburn Morison regretted that in so many quarters the old bone pathology was still being taught.

Dr. W. H. COLDWELL said a common site of calcification was the pineal gland, and another the costal cartilages; he would like to know the reason for the early disposition of lime salts in costal cartilages, and also why the age-incidence of calcification was so varied in different people. If patients with linear cracks in bone were followed up it would be found that these cracks were later filled with new bone.

Dr. H. B. SCARGILL (Leeds) described his sensations and experiences while suffering from supraspinatus tendinitis. The pain, he said, was like a toothache round the shoulder-joint; the time of greatest intensity was at night, and it was difficult to get the arm into a comfortable posture. Movements of arm and scapula did not seem to influence the pain. At one time he suddenly got agonising pain and the shoulder-joint was more or less locked. When the pain eased somewhat, on the second day, a radiogram was taken, and a shadow was seen just above the head of the humerus. Operation was to have been done to remove what appeared to be a piece of bone, but a bad cold postponed the procedure, absorption took place, and he had no more pain. He attributed the onset to the exertion of daily cranking his car.

Mr. WATSON JONES, in reply, said there was no more vascular tissue in the body than fibro-cartilage, and the question of age did not necessarily come into the calcification problem. Possibly trauma of the scaphoid could cause traumatic hyperæmia and decalcification with the formation of a cyst, but that he regarded as quite rare. It was common to meet with a fracture of the scaphoid of so slight degree that it was not detected on the first day of the injury. Nowadays many surgeons examined radiograms of the wrist with a lens to detect any cracks before passing a wrist as sound.

HUNTERIAN SOCIETY

A MEETING of this society was held at Simpson's Restaurant, Cheapside, on March 20th, with Dr. NATHAN RAW in the chair, when a discussion took place on

Practical Dietetics

Prof. S. J. COWELL said that a first requirement of one starting to practise dietetics was a knowledge of the composition of normal diet—that is to say, of a diet capable of promoting nutrition. During the last few years the attention of people who had been working on the subject of nutrition had been focused largely on the importance of certain constituents of diet which, 20 years ago, were quite unrecognised. He referred, of course, to the vitamins and also to the mineral salts, the significance of which was only now being appreciated. Eventually it should be possible not only to name the essential components of a diet, but to determine the quantities of all constituents needed under varying conditions.

The next point was to discover in what foods these constituents were present. The constituents of foods varied considerably according to the conditions under which the foods were produced. The nutritive properties of milk varied according to the way in which the cow was fed, of vegetables according to the soil. It was said that the type of manure applied to the soil in which a plant was grown affected its content of vitamin B. It was not always appreciated how varied might be the mineral content of green vegetables. The outermost leaf of the cabbage might contain 30 times as much calcium as the inner part, and four or five times as much calcium even as the leaf next to it.

A third point to be considered was the physiological or pathological effects of excess or deficiency of food factors. It was known that a deficiency in the diet of a particular vitamin led to certain ill-effects, but in the present state of knowledge the signs of each deficiency could not always be distinguished. Probably small degrees of deficiency in vitamins and in mineral salts produced certain symptoms not at present recognised which it would be possible to distinguish in the future. A Swedish investigator had found that in slight deficiencies vitamin C led to a certain weakening of the capillaries, and so caused liability to unusual bleeding under slight stress. The susceptibility to hæmorrhage had been found to vary according to the amount of vitamin C. There was now a tendency, Prof. Cowell continued, to regard some diseases which a few years ago were considered purely deficiency diseases as being more complicated in their origin. Beri-beri used to be definitely ascribed to the eating of polished rice; the tendency now was to regard it as not due purely to a deficiency of one factor, because in many cases a supply of the missing factor did not definitely cure

the disease. It had been suggested it might be associated with a combined deficiency of vitamin B_1 and some other food factor, or some constituent in the diet which actually created damage in the absence of the protective antineuritic vitamin. The same argument was gaining ground with regard to pellagra, which a few years ago was regarded as due to a deficiency of vitamin B_2. It could be argued that rickets was not a pure food deficiency disease, for though it would not develop in the presence of an ample supply of vitamin D, it would be quite possible to arrange to keep individuals on the same diet and to allow rickets to develop in one and not in another, because exposure to sunlight or ultra-violet radiation could compensate for the absence of vitamin D in the diet.

Dietetic factors were used for the cure of diseases not in the ordinary way produced as a result of dietetic deficiency, as for example liver in pernicious anæmia. Dr. Cramer had shown that a definite nephritis could be produced in animals if the diet was constructed in such a way that it contained a smaller quantity of magnesia than normal. In the treatment of bone diseases there was scope for the application of modern principles of dietetics, and an enormous field lay open to the pædiatrician in this respect. The growing child was particularly sensitive to deficiencies in his diet. In this country probably the elements most likely to be lacking in the diets of infants and young children were vitamins A, which played an important part in the normal development of tissues, and vitamin D. Mrs. May Mellanby had found that young dogs fed on a deficiency diet showed a pronounced tendency to pyorrhœa alveolaris, and that the condition could not be cured—or could only occasionally be cured—by supplying vitamin A to the adult animal; whereas animals fed with a proper supply of this vitamin early in life did not develop pyorrhœa. There was no doubt great scope for the application of modern principles of dietetics in antenatal treatment. A woman during pregnancy should be supplied with a diet particularly rich in protective elements. The possibility that the size of the child at birth could be influenced by restricting the diet of the mother had, he believed, led a certain accoucheur deliberately in cases to restrict the quantity of the diet of a mother with a small pelvis. Various dietary restrictions, particularly of protein intake, might lessen the tendency to toxæmia during and immediately after delivery.

Dr. W. CRAMER said that in view of the large number of different constituents necessary to diet it seemed in theory impossible to construct a diet which was adequate; but, of course, long before anything was known of modern dietetics millions of people had lived long and healthy lives on diets dictated by experience. The right diet was a very mixed diet if one could afford it. The problem of applied dietetics was not a question so much of vitamins and salts as of cost. The only way in which to construct a sound dietary was to build around the basis of cereals and milk. A diet of cereals and milk in itself was not adequate, but it avoided most of the mistakes, and it furnished in the cheapest possible way proteins, fats, carbohydrates, and most of the important salts except iron, and most of the vitamins except vitamin C. Yet the consumption of milk in this country was probably lower than anywhere else in the civilised world, and at the same time the dairying industry was crying out that it was ruined. The addition to cereals and milk of a small amount of fresh fruit, vegetables, and a little meat would provide as good a diet as could be obtained on a limited income. It was interesting to speculate what would have happened if vitamins had not been discovered, because, about 50 years ago, a complete revolution was made in dietary by the introduction of roller mills to produce white flour whereby the cereal on which the population mainly lived—namely, wheat—was deprived of vitamin B. White flour did not contain vitamin B, and the small amount of yeast that went into bread making brought in so little vitamin that it did not count. A second revolution was to substitute margarine for butter. If it had not been for the discovery of vitamins, these revolutions in the production of food would have gone on uncorrected.

Another important lesson learned from the vitamins was a new conception of the pathology of certain diseases. Animals which developed infections spontaneously were just as resistant as any others to infections introduced experimentally. The explanation, he thought, was that the mucous membrane of the respiratory and intestinal tracts was as much dependent on the supply of vitamin A as, for example, the uterus was dependent on the supply of ovarian hormone. It was easiest to think of vitamins as substances very like hormones, but instead of being manufactured in the body they were contained in the material eaten. When an insufficient amount of vitamins was taken certain specific tissues atrophied, with the result that, in the case of the intestinal tract, bacteria which normally inhabited the mucous membrane crept into the crypts and proliferated there, giving rise to a condition of alimentary toxæmia, and this, passing into the blood, set up a metastatic infection. Vitamin A did not seem to protect at all against virulent bacteria. He did not think that appendicitis occurred any more frequently among people on a deficiency diet than among people who had all the vitamins they required; nor did he think that any of the severe enteric infections were the result of deficiency. It appeared to be only the normal inhabitants of the respiratory and intestinal tracts which were kept in check by the normal mucous secretions. Nevertheless, there were probably a great number of conditions which began at any rate with a very indefinite condition of alimentary toxæmia, or whatever it might be called, and on that basis other diseases were implanted, so that the whole picture was very complicated.

Dr. S. MONCKTON COPEMAN referred to the question of possible danger from excess of certain dietetic factors, more particularly vitamins. It was not impossible that an excess of growth-favouring factors, which of course were absolutely essential to the young child, might be detrimental to the adult. He had tested the question first by experiments on animals and later in an experiment on human beings. Mice and rats were inoculated experimentally with cancer and put on a special dietary, and although they had not succeeded in preventing the development of cancer, the resulting tumours were more than three-quarters less in size than in the controlled animals. Certain patients suffering from cancer were found who were willing to adopt the dietaries suggested—namely, dietaries from which animal fat, eggs, cream, suet and the like had been eliminated. It was suggested that such a deprivation of food would have a detrimental effect in a depressing disease like cancer, but actually it was found that the patients so treated—who were hopeless from the operative or any other point of view—showed prolongation of life for months and years, and their painful symptoms were manifestly relieved. Dr. Copeman quoted statistical

evidence favouring the theory that the incidence of cancer is affected by diet.

Sir FREDERICK HOBDAY spoke on dietetics as applied to veterinary medicine. A careful adjustment of diet had been successful in eliminating certain bowel diseases of horses. Since the instruction was given in large studs that horses were not to be allowed to drink a large quantity of water immediately after feeding, but to take water before feeding, the amount of colic had greatly decreased. A further factor was that horses, thanks to the eight-hour day for their drivers, were not nearly so overworked as in former years, and the disappearance of excessive fatigue had contributed to the same result. Asthma and allied ailments were quite common among horses and other animals which were fed irregularly, and various illnesses attacked dogs which were pampered and were not given the hard dog biscuits on which others flourished. The work done on calcium deficiency disease in cattle saved the agriculturists in this country a large sum of money every year.

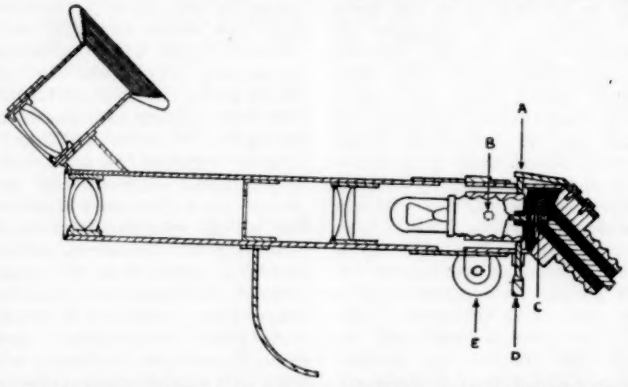
Sir ARNOLD THEILER spoke of mineral deficiency diseases in herbivorous animals as observed in South Africa; and Mr. H. H. GREEN of an acute intoxication found in cattle, which promptly disappeared when the animal was fed with phosphorus.

NEW INVENTIONS

A HAND SLIT-LAMP

THE value of the standard forms of slit-lamps for certain ophthalmic investigations is undoubted. But the immobility of these large instruments limits their use to the consulting-room and clinic.

The hand slit-lamp illustrated has been devised with the intent of securing an instrument that could be used as readily and as easily as an electric ophthalmoscope, so that it can be carried about and used with ease for the examination of children and patients in bed or in their own homes. It cannot by reason of its small size compete with the large instruments in magnification and in resolution of fine detail. Yet it will secure a valuable view of the media of the eye as deep as the anterior part of the vitreous. The small lamp as compared with the large might be said to have something like the relation of the two-thirds inch objective of the microscope to the one-sixth inch objective. But the small lamp gives the same effect of depth as the large lamp, so that its value for localisation is certain.



In the diagram, A represents the spring and D the screw controlling the lamp centre. B indicates the position of the trunnion, C the centre contact of the lamp, and E the clamping screw. Note that in practice the filament and slit are horizontal.

The lamp is fitted to the battery handle of an electric ophthalmoscope, or a small adapter can be supplied with leads to a torch battery or other suitable source of current. At the upper end, set at right-angles to the ophthalmoscope handle, is an eyepiece consisting of a triple achromatic lens giving a linear magnification of × 12. The lens holder is so made that other powered lenses can be substituted. The case of the eyepiece is graven with a scale, so that the focus of the lens, once found, can always be recovered.

Below the eyepiece, and at an angle of 45° to it, is the projection combination, forming a horizontal slit of light at a distance of one inch. It comprises a gas-filled lamp with a single-strand filament, made for two-cell or three-cell dry batteries. The centre pole of the lamp abuts on to a spring contact, so that all lamps can be set with the filament horizontal. A powerful condensing system produces an image of the filament upon a slit fixed in the tube, so that the projection lens, an achromatic lens of some 60 dioptres, can form a clear image of this slit, free from disturbing haze or filament irregularities.

In use, the instrument must be kept steady in relation to the eye of the patient, and yet allow focusing for depth. This can be obtained by the following manœuvre. The lamp is held by the main tube with the battery handle or adapter hanging down. There is a trigger-like spur projecting below the main tube, and this lies conveniently between the second and third fingers. The thumb rests on the top of the tube, with its end in the angle between the tube and eyepiece; the forefinger lies along the side, so that the projecting tip of the finger can rest against the patient's cheek at the lower border of the orbit. This contact gives steady support. Alternate crooking and straightening the forefinger brings the lamp nearer or further from the eye and gives focusing for depth.

Adjustments of the instrument are of the fewest, normally the eyepiece alone is likely to require setting. But the setting of the lamp bulb, in case of replacement, needs attention. The filament must be horizontal and in the axis of the system. Whether or no this adjustment is correct can be seen by looking at the face of the projection lens. The bright line of light should cut the lens horizontally into two equal parts. If this line is not true the position of the filament must be altered. The lamp mount is pivoted at its front end on a horizontal axis on trunnions. At the back there are a screw and a spring on a vertical axis, the one lifting the back, the other allowing it to fall. As the back rises, so the filament is lowered and vice versa, the movement being made by releasing or screwing in the lower screw. The distance between the lamp and the condenser system can be varied by loosening the large-headed screw under the lamp end of the tube and allowing the tube to slide over the lamp stem a little. This large-headed screw should be turned firmly when the adjustment has been made. Once the adjustment is obtained it need not be altered until a new lamp is required.

It is better not to wear spectacles when using the lamp so that one's eye can be well within the shield of the ocular. It is well not to over-run the electric bulb, so when a new battery is used the switch to the rheostat should be turned on no more than two-thirds until the battery weakens.

The hand slit-lamp is made by Messrs. Rayner of New Bond-street, London.

N. BISHOP HARMAN, F.R.C.S.

WORK OF WOMEN'S HOSPITALS.—The report for 1932 of the Royal Waterloo Hospital for Women and Children states that there were 2300 in-patients and 14,740 new out-patients; the latter made over 76,000 attendances. There is an accumulated deficit of £5000.—The Birmingham and Midlands Hospital for Women (the Women's Hospital, Sparkhill, and the Maternity Hospital) and the district midwives last year dealt with 6462 patients. The pressure on the beds at Sparkhill was "greater than ever"—there were 2666 patients. The average cost per in-patient was 10*s.* 8*d.* per day. There were 1734 in-patients at the Maternity Hospital.

REVIEWS AND NOTICES OF BOOKS

Significance of Phosphoric Esters in Metabolism

By ROBERT ROBISON, Ph.D., D.Sc., F.R.S., Professor of Biochemistry, University of London; Head of the Department of Biochemistry, Lister Institute of Preventive Medicine. New York: University Press. 1932. Pp. 104. 11*s.* 6*d.*

THERE have been of recent years many publications on the rôle of phosphorus in the body, and the whole question of phosphorus metabolism has become one of the utmost importance, and not only from the point of view of the human biochemist, since phosphorus has a bearing on many fermentation processes. This volume is based upon the three Christian A. Herter lectures given by Prof. Robison in New York in 1931. It is always a source of pride for English workers to look through the list of Herter lecturers and to see the relatively large number of British investigators. The original lectures have been expanded, and a very full review of the literature up to 1932 is here provided; the major contributions in this particular field have been made by Prof. Robison himself.

The first lecture deals with the distribution of phosphoric esters in nature and gives an up-to-date account of the very loosely defined group of substances of the lecithin and phospholipin type. The compounds of phosphoric acid with the carbohydrates are described and particular reference is made to the occurrence of the compounds in bone. The second lecture deals with the method of calcification occurring naturally in cartilage and bone, and here is to be found a very readable account of the researches which have been conducted during the last ten years at the Lister Institute. The final lecture is concerned with calcification in vitro and establishes with precision the conditions which govern this complicated process.

The work is essentially a summary of what is known about phosphorus in connexion with metabolism, and is a very valuable contribution to the literature of this subject.

L'angine de poitrine

Formes cliniques traitement médical et chirurgical. By CAMILLE LIAN, Professeur agrégé à la Faculté de Médecine de Paris; Médecin de l'Hôpital Tenon. Paris: Masson et Cie. 1932. Pp. 430. Fr.55.

Prof. Lian and his pupils, after detailed and exhaustive study, have come to the conclusion that angina pectoris is a syndrome, encountered in diseases of the arteries or of the heart of most diverse kinds and found even where no cardiac lesion exists. They point out that to give this name to one particular category is as valueless as to say that hæmoptysis shall be the name given only to those cases where pulmonary tuberculosis is the cause of the coughing up of blood. Nevertheless, they admit that the fundamental though not unique cause is coronary stenosis. The clinical manifestations are divided into three big ætiological groups: (1) angina cardio-arterial, coming on generally after the age of 40 years in cases showing hypertension or vascular sclerosis; these cases constitute four-fifths of all cases of angina pectoris; (2) angina of cardiac origin appearing at about 30 years of age in subjects suffering from rheumatic valvular disease or purely functional conditions, such as paroxysmal tachycardia; (3) functional angina attacking subjects with normal cardiovascular systems. These three groups are subjected to minute clinical, electrocardiographic, and anatomical examination, and a further subdivision is made of the cardiovascular anginas into the common form accompanying muscular effort or effort and repose; the so-called "Angor aigu coronarien fébrile," the name given by Lian to the condition we know as coronary thrombosis; and finally the abdominal anginas. The functional anginas are divided into reflex, nervous, and toxic. The section on treatment is exceptional in being sufficiently long and detailed to be really useful. All the usual methods are discussed, and in addition three less well-known treatments are described in detail—namely, the intravenous injection of iodides, subcutaneous injections of carbonic acid gas, and application of X rays; these measures are said to have given particularly good results. According to Prof. Lian certain cases have rapidly and definitely improved under radiotherapy, even when all medical treatment has failed; in some cases, on the other hand, it has no effect. Diathermy is discussed both as a form of treatment in coronary thrombosis, where it is said to alleviate the pain, relieve the spasms, and improve the circulation, and in angina pectoris of whatever ætiology; Prof. Lian has abandoned diathermy except in cases of coronary thrombosis and in a few cases of reflex angina. The use of muscle extract is dismissed with the statement that the premises on which its use is based are so little credible that it should fall rapidly into well-deserved obscurity.

Prof. Lian's teaching is clearly and methodically set out and is easy to follow, and an extensive bibliography is supplied.

Clinical Gynecology

By C. JEFF MILLER, M.D., Professor of Gynecology, Tulane University School of Medicine. London: Henry Kimpton. 1932. Pp. 560. 50*s.*

ONE of the most important contributions to gynæcology in recent years was Prof. Jeff Miller's "Introduction to Gynecology," which provided, in delightful style, a short summary of gynæcological diagnosis and pathology. This was a good basis upon which students could build a study of gynæcology. A companion volume has now been prepared in order that students already well grounded in diagnosis and pathology should learn therapeutics from the same reliable teacher. The work is, however, not quite so satisfactory as its predecessor, though it contains much useful information, and the opinions expressed are for the most part sound. The section dealing with the treatment of salpingitis is an excellent contribution, full of wise judgment, which deserves careful study. Similarly the treatment of carcinoma of the cervix is admirably dealt with from all points of view. But some of the minor gynæcological ailments receive scant attention, and it is doubtful whether practitioners will be satisfied by the paragraphs on pruritus vulvæ. Trichomona vaginitis is considered in detail; it is extraordinary how many different treatments are in use. Operations are described separately at the end of the book; illustrations are plentiful, but some of the drawings might be clearer. There is some repetition, for treatment, which is often operative, is described in

the first part of the book, and later on the operation is detailed again. Moreover, in certain places, after-treatment is described before technique has been considered. Despite these disadvantages, the book is a worthy contribution illustrating the practice of the modern school of American gynæcology, and should be of particular service to resident medical officers.

Walter Bradford Cannon

Exercises Celebrating Twenty-five Years as George Higginson Professor of Physiology October 15, 1931. Harvard University Press. 1932. Pp. 94. 10*s.* 6*d.*

Prof. Cannon has been for many years a leading physiologist, and in America one of the relatively few who have followed the outlook and technique of what may be called classical British physiology. For these and for personal reasons many people in this country will be interested to read this account of the ceremonies at Harvard surrounding the presentation of his portrait: a reproduction of the picture and a charming speech by the late Prof. Graham Lusk should reconcile them to the rather excessive price. Prof. Cannon's implacable faith in the righteousness of investigation has led him into many fruitful inquiries, still, we hope, far from finished. Much of his work was admirably summarised in his recent book "The Wisdom of the Body," and his explanations of shock, of how we get into a temper, why we are thirsty, and so on, have made his name familiar to many who are not professional physiologists.

Epidemiology in Relation to Air Travel

By ARTHUR MASSEY, M.D., D.P.H., Medical Officer of Health for the City of Coventry. London: H. K. Lewis and Co., Ltd. 1933. Pp. 68, and five maps. 7*s.* 6*d.*

THIS little book is an elaboration of the speculations which Dr. Massey has previously made [1] on the possible risks to the public health arising from the introduction of regular long-distance flying, together with a summary of the views of others on the same subject. By means of excellent maps he shows that journeys by air from distant countries can now commonly occur within the incubation period of the major infectious diseases. He also discusses the possibility of insect vectors being transported alive by air into uninfected areas, and various subsidiary questions, such as the disposal of sewage from aircraft and the general difficulties of sanitary control. It is a pity that the text of the proposed International Convention for the Sanitary Control of Aircraft is not given. The diseases considered are yellow fever, cholera, plague, malaria, typhus fever and relapsing fever, and small-pox.

Materia Medica, Pharmacology and Therapeutics

Third edition. Reset. By WALTER A. BASTEDO, Ph.G., M.D., Sc.D. (Hon.), F.A.C.P., Assistant Clinical Professor of Medicine, Columbia University. London: W. B. Saunders Co., Ltd. 1932. Pp. 739. 32*s.* 6*d.*

THERE is nothing strikingly original in the arrangement of matter in this book, which in the main follows the lines of some of the better known works on pharmacology and therapeutics in this country. But it is written by a physician of experience who is also a pharmacologist, and therefore most stress is laid upon that aspect of pharmacology which is of immediate practical interest and importance. The first part of the book consists of a succinct description of the constituents of organic drugs, pharmaceutical preparations, and methods of administration, and of dosage; while it closes with a brief but adequate discussion of the rapidly decaying art of prescription writing. By far the greatest part of the book is taken up with the discussion of individual remedies. These are classified in some instances according to their action on different parts of the body, the circulation, the central nervous system, the peripheral nervous system; in others according to their therapeutic uses as cathartics, diaphoretics, emetics, and so forth. The section on the pharmacological action of drugs is up to date and adequate, and the discussion on their therapeutic uses is in many cases excellent though occasionally a little uncritical.

The book can be cordially recommended to students and practitioners of medicine.

Basic German for Science Students

By MARIE L. BARKER, Ph.D., lecturer in German in the University of Edinburgh. Cambridge: W. Heffer and Sons. 1933. Pp. 164. 6*s.*

"IN the beginning God created heaven and earth" is an unusual sentence to find at the beginning of a scientific book, yet in the introduction to this book the author has successfully used the first chapter of Genesis as the reading matter on which she has based her outline of German grammar, and from which she has drawn many of the important basic words which must be learnt at an early stage in every language. In the next section of the book (Part I.), which is devoted to general passages, the author proceeds further to enlarge the student's vocabulary with passages describing the more advanced version of the same phenomena supplied by science, and also the development of man and his civilisation. Two extracts from general scientific works precede Part II., which is made up of a variety of technical passages typical of the vocabularies of the different branches of science; chemistry, botany, physics, mathematics, and medicine are all represented. The medical extracts include samples on therapeutics, pathology, histology, physiology, anatomy, and embryology, and the book is arranged so that it may be used by the student who is teaching himself. Sufficient grammar for a reading knowledge of German is given clearly and concisely in the introduction, the English version of each prose passage is printed opposite the German, and basic words are printed at the foot of each page as they occur. The author hopes, perhaps optimistically, that having reached the end of the book the student should be familiar with over 1000 basic German words. The work includes also some specimen examination papers for chemistry students and a complete vocabulary where basic words are printed in heavy type. Some sensible phonological hints are given at the beginning, and there is a short list of useful abbreviations and chemical terms at the end of Part II. This book should give the student an adequate general foundation for the reading of scientific German, and after mastering its contents he should have no difficulty in getting up the technicalities of his own specialty.

[1] See THE LANCET, 1931, ii., 591.

THE LANCET

LONDON: SATURDAY, MARCH 25, 1933

THE MECHANISM OF PROTEINURIA

ALTHOUGH "albuminuria" is common enough, and has long been the subject of careful clinical observation, the mechanism whereby protein can escape from the blood into the urine has not yet been adequately explained; indeed, relatively little sustained effort has been made of late years to elucidate this problem. It is known, of course, that egg-albumin, if introduced into the circulation of a mammal, will be excreted in the urine, and this effect has usually been explained by the hypothesis that the kidney acts as an eliminator of foreign substances from the blood, but CUSHNY in his monograph on the excretion of the urine observed that the glomerulus usually appeared to be impermeable to colloid substances, and concluded that the passage into the urine of proteins, such as egg-albumin, was dependent upon glomerular damage. Very little advance has in fact been made in our knowledge of this aspect of renal function since the work of POSNER at the end of last century.

In a recent contribution to THE LANCET [1] Mrs. PHYLLIS KERRIDGE, Ph.D., and Dr. L. E. BAYLISS attacked the view that the excretion of proteins by the normal kidney depends on whether they are foreign to the body. And on the basis of a number of perfusion experiments with the pump-lung-kidney and with intact anæsthetised animals they have been able to show that the facility with which any protein passes through the glomerulus depends upon the size of its molecule. Their estimates of the molecular weights of the different proteins used have been taken from SVEDBERG'S figures. Molecules with a weight below 68,000, such as egg-albumin, gelatin, and Bence-Jones's protein are excreted, while those with a weight above 68,000, such as the serum proteins, are retained. As promised in their first communication a full account of the work has now been published elsewhere[2] with the collaboration of Dr. DOROTHY S. RUSSELL, who has examined histologically a number of the kidneys used in these experiments. Those interested in the subject should refer to this paper for details. Without losing sight of the fact that alterations in capillary permeability are doubtless responsible for proteinuria in some diseases of the kidney and of the cardiovascular system, it is clear that a good case has been made out for a purely mechanical basis of proteinuria in the normal kidney. Both physiologically and histologically there was no evidence of any glomerular damage associated with the passage of the smaller protein molecules, such as egg-albumin, into the urine. But lest the reactionary-minded should still argue that damage may yet exist that eludes microscopical examination, an interesting observation by these investigators may be quoted which seems to dispose of this objection. It happens that gelatin, in distinction to other proteins, is not precipitated by trichloracetic acid. The passage of gelatin into the urine in these perfusion experiments was detected by means of picric acid, and the addition of trichloracetic acid caused no further precipitate such as would be anticipated if the glomerular capillaries had sustained any injury that caused an increase in their permeability.

The replacement by this newer mechanical hypothesis of the older teleological theory that ascribed an almost uncanny power of discrimination to the renal glomerulus will be welcomed as an advance in our conception of renal function. It will doubtless be asked what light such a theory may throw on the question of clinical albuminuria. It is clearly desirable that the physical properties of the proteins that are excreted in such disorders as cardiac failure, nephritis, and so on should be investigated anew. An encouraging start in this direction has already been made by E. ANDREWS, W. A. THOMAS, and W. F. WELKER,[3] who find that nephritic serum, though poorer in proteins than normal serum, has greater hydrophilic properties, while the urinary proteins show an abnormally high degree of dispersion and will readily pass through a collodion membrane. The proteins excreted in nephritis appear therefore to differ from the normal blood proteins. On the basis of their experiments these workers suggest that alterations in the mineral salt balance result in a pathological escape of tissue proteins into the circulation in nephritis, with the formation of protein complexes possessing a smaller molecular aggregation or in a higher state of dispersion than is normally associated with the serum proteins. This, though admittedly pure theory, converges in an interesting way towards a possible common ground with the theory of KERRIDGE and BAYLISS. The investigation of various types of nephritis from this angle may be expected to throw valuable light on the disturbances of metabolism that occur in Bright's disease.

[1] THE LANCET, 1932, ii., 785.
[2] Jour. of Physiol., 1933, lxxvii., 386.

A TEST OF TELEPATHY

BELIEF or disbelief in the possibilities of telepathy and feats like water-divining seems to be determined by temperamental rather than intellectual influences. To some people belief in them is a clinging to the superstitions of a pre-scientific age; to some they offer a field of research that may ultimately enlarge the scope of science; to some they give a pleasing proof of the impotence of science to understand certain phenomena the existence of which it conveniently denies. Perhaps it is asking too much

[3] Arch. Internal Med., 1929, xliii., 445.

of mankind to hope for a final decision and cessation of argument, but it is not too much to ask that any serious investigation should take into account all the pitfalls, statistical and psychological, that may lurk beneath the simplest-looking and most convincing observations.

Incidents of "premonition" or of knowledge of events happening beyond the individual's ken, and subsequently found to be true, are, as everyone knows, by no means rare. The difficulty in assessing their value as evidence of telepathy, or of some other psychic power, lies in the absence of any means of measuring the probability that they are not due to coincidence. A common example of premonition in the war period was the feeling of a mother that her son was in danger and calling for her help, and the subsequent news that he was killed at that hour. But it is obvious that innumerable mothers must have had the same feeling at one time or another during the period of the war, and it is only when the thought and the subsequent news coincide that the premonition is remembered and recorded. In such matters the common error of recording the "successes" and ignoring the "failures" is at its highest. Another test of telepathy commonly adopted is that in which one person endeavours to convey to another "telepathically" some object of fact which he has in his mind. Such a test, it will be remembered, was carried out a few years ago under the auspices of the B.B.C. In these tests also we do not know the underlying probabilities, or in other words what proportion of right answers are likely to be due only to coincidence.

It was this suggestive type of test that was employed by the wife of UPTON SINCLAIR whose book on this problem was discussed in our columns three years ago.[1] The general plan of the experiments was that a man agreed to make a drawing of any object he might select at random and then to sit gazing at it and concentrating his entire attention upon it for a period of from 15 to 20 minutes. At the same agreed hour Mrs. SINCLAIR was lying 40 miles away in semi-darkness with her eyes closed, employing a system of mental concentration. "As a result she took pencil and paper and wrote, with the date, in six words exactly what the drawing would be found to be. And so it was." UPTON SINCLAIR gives 65 drawings which he calls successes and about half of 155 which he called partial successes. This number, he says, is too great for coincidence. On the other hand, apart from the probability problems involved, another factor has crept in here—the subjective factor; for *someone* must decide what *is* a success, what is a partial success, and what is a failure. Dr. E. E. FREE argues that while there are many reported experiments of this type, suggestive of the possibility of telepathy, there are none which could be called complete and satisfactory proof. In an article in the *Scientific American* (March, 1933) he proposes a simple test in which he asks readers to participate. The experiment merely consists of two persons making a large number of throws with an ordinary die. The "transmitter" looks at the number thrown each time and concentrates upon it; the "percipient" who is blindfolded states the number. The reply is recorded, without comment, as right or wrong; 500 such throws, it is reckoned, can be made in one hour—though but seven seconds for a shake of the die, a throw, the thought transference and the recording of the reply, seems somewhat too little. If a large number of such sets are obtained it will become clear whether the number and distribution of correct guesses differs from that to be expected from the theory of chances. If it does not, then there will be presumptive evidence that readers of the *Scientific American* (or rather, a "selected" group with time and inclination for such tests) do not as a class possess telepathic ability. At the same time provision is made to get in touch with those, if any, whose results do suggest more than the operation of mere chance. The working out of the chance distribution may, eventually, prove somewhat more difficult than may seem at first sight, owing to the fact that ordinary commercial dice are on the average not true, and tend to record an excess of high numbers.

Such attempts to transfer the tests of telepathy to experiments in which the underlying probabilities are known are not new, as Dr. FREE realises. Tests have been made with playing cards, one person attempting to "send" and another attempting to "receive" the names and suits of cards turned up at random. Many interesting examples of these tests are to be found in the work of JOHN COOVER,[2] who concluded that "no trace of an objective thought-transference is found either as a capacity shared by our normal reagents in general or as a capacity enjoyed in perceptible measure by any of the individual normal reagents." The results of experiments with ten "psychics" (reputed to be specially gifted with a power of telepathy or clairvoyance) seem to differ in no essential respects from the results of the experiments with normal reagents. Some of these results have been discussed from the statistical aspect by the late Prof. EDGEWORTH.[3] The latter found that the number of "successes" in a group of experiments was certainly greater than would be expected by mere chance; yet in a control group in which the agent did not endeavour to "transmit" the card but the recipient guessed it, the number of successes was likewise excessive. "What if the explanation," writes Prof. EDGEWORTH, "should prove to be the same for both phenomena—namely, the impossibility of realising ideal randomness, the tendency of law to recur however much we try to expel it by instruments of chance." The marriage of telepathy and the theory of probability may still be unproductive of the convincing proof Dr. FREE seeks.

[1] See THE LANCET, 1930, ii., 252.

[2] Experiments in Psychical Research at Leland Stanford Junior University. By John Coover, Stanford University. 1917. Pp. 641.

[3] Jour. Roy. Stat. Soc., 1919, lxxxii., 222.

THE NATURAL HISTORY OF RHEUMATIC FEVER

NEARLY a hundred years ago Latham wrote of the need for better clinical control of the various methods of treatment advocated for acute rheumatism, and despite other advances since that time the need remains urgent to-day. For this reason a group of workers in New York have been studying [1] a series of cases in which all the usual antirheumatic drugs were withheld in order to see what was the natural course of the untreated disease. Actually every care was taken to prevent pain and discomfort—by placing the patients in special beds, by protecting painful joints with cotton-wool and cradles, and by administration of codeine. It is also stated that a special diet was given, efforts were made to force fluids, and "when infected foci were found every effort was made to eradicate them." Under these conditions the progress of the disorder was investigated very elaborately. A detailed history was obtained upon a special form, members of a patient's family were interviewed, and the home was visited by a special medical social worker. The pulse-rate and rectal temperature were taken every four hours. A complete blood count was done on admission, twice a week during the acute stage, and once a week up to discharge. An electrocardiogram was taken at similar intervals or even daily if there were acute cardiac complications. Blood cultures were made in all cases at frequent intervals, skin tests with streptococcal filtrates were carried out, the heart was radiographed as soon as possible after admission, and X rays were also used to investigate the teeth, nose, throat, and accessory sinuses. Notes were made at least once daily by clinical observers.

During the two years of this comprehensive investigation 162 patients with acute rheumatic fever were studied. Of these 50 were treated with salicylates or vaccine and were not included in the present survey, which comprised 105 who had no form of therapy which might be regarded as specific, and no antipyretic drug. They were considered in three groups, all having active disease: those with polyarthritis with either no heart involvement or old cardiac trouble which was inactive; those with chorea; and those with a history of repeated rheumatic infection and advanced structural heart disease. Actually only 47 patients remained in hospital long enough to fulfil certain conditions laid down as to the cessation of activity, the remainder leaving for various reasons. The age-distribution of these 47 patients was as follows: under 20 years, 18; between 20 and 29 years, 11; between 30 and 39 years, 14; and between 40 and 49 years, 4. They were distributed in the three groups outlined above, with 29 in the polyarthritis group, 6 in the chorea group, and 12 in the carditis group. The actual clinical results in this total of 47 cases are set out in great detail. Comparing these patients with another series described by H. F. Swift, in which drugs were used against the rheumatic process, the present authors conclude that the elimination of such remedies did not prolong the illness. Without antipyretics the temperature appeared to subside spontaneously; as a rule it became, and remained, normal after but a single cycle of fever. In 22 out of the 29 patients with polyarthritis the joint complications subsided, untreated, in a week, and recurrences, which were seen in half the cases, affected fewer joints, were less severe, and were of shorter duration than the initial attacks. Cases were encountered in which spontaneous subsidence of arthritis was as abrupt and complete as when salicylates were used.

Variations in the P–R interval noted on the electrocardiogram were wide and inconstant and did not appear very different from those seen in patients who had had salicylates. Tachycardia, like the fever, in general appeared to subside spontaneously. There were six deaths in the series, five from cardiac failure in association with active carditis, and one with pericarditis and profound toxæmia with a rapid downhill course from the onset. Unfortunately studies of the sedimentation-rate were not made, for the method only became known to the authors after the work had been begun; but their studies seem to have been sufficiently exhaustive to justify the conclusion that "in adolescence and adult life the acute manifestations of rheumatic fever tend to subside spontaneously."

[1] Graef, I., Parent, S., Zitron, W., and Wyckoff, J.: Amer. Jour. Med. Sci., Feb., 1933, p. 197.

ANNOTATIONS

TWO VIEWS OF PEPTIC ULCER

THE many factors that may promote peptic ulceration can be classified as general or local: under the one heading we have all the circulatory, toxic, chemical, and constitutional variations which are suggested as exciting or predisposing causes, while under the other there are several possible sources of damage to the mucous membrane. The part played by dietary indiscretion in causing such damage has lately been considered by Prof. R. Ehrmann,[1] of Berlin, who has analysed some 7000 cases of peptic ulcer and also about 800 autopsies. He notes that during the years 1917–24 there was a gradually increasing incidence of ulcer, followed by a conspicuous diminution. This rise during and just after the late war Ehrmann attributes to the unsatisfactory diet of those times, which he regards as very favourable to the production of local gastric injury. He points out that at this time the diet was voluminous, coarse, and lacking in fat, so that the stomach was likely to be unduly distended. According to his view, peptic ulcers arise, like wounds of the skin, through injuries, hæmorrhages, or necroses, particularly situated along the *Magenstrasse*—i.e., the lesser curvature—and are primarily due to faulty diet. Gastric ulcer he describes as a disease of the "seven lean years" in contrast to cholelithiasis which he regards as a disease of "fat years."

L. W. Kohn,[2] on the other hand, assumes that various factors are responsible, and emphasises the significance of local thrombosis of gastric arteries, comparing them with the changes seen in thromboangiitis obliterans. On these lines he has treated a number of patients with intravenous injections of sodium citrate, in the hope of improving the local blood-supply to the stomach. In his studies, which are not reported in detail, he has noted an increased clotting tendency of the blood in ulcer patients, and he considers that sodium citrate has the ultimate effect of lessening coagulation, in spite of some

[1] Deut. med. Woch., Feb. 3rd, p. 166.

[2] Med. Jour. and Record, Feb. 1st, 1933, p. 103.

evidence to the contrary. The exact solution he has employed has been a slightly alkaline mixture of sodium citrate, sodium chloride, and a buffer agent dissolved in doubly distilled water, which can be obtained commercially under the name Citrosalven. The injections have usually been of 50–100 c.cm. or more, and have been given daily, twice weekly or later every three or four weeks. Besides the injections patients were mostly given some alkaline powder three or four times a day, and a diet mainly composed of soups, cereals, fish, chicken, stewed fruit, weak tea, and simple puddings. Kohn records that of 50 patients so treated, all of whom had had symptoms for at least four years, 8 were apparently cured, 12 markedly improved, 8 improved, and 2 only slightly benefited. Taking into consideration the fact that these were chronic cases which had previously been under various forms of treatment by diet, duodenal feeding, alkalis, and so on, the proportion of good results is undoubtedly high. In some of them radiographic control of the ulcer was carried out, though few details are given; gastric analysis was also performed in some of the cases before and after treatment, but showed little change.

Kohn concludes that the factor immediately concerned in the production of peptic ulcer seems usually to be a thrombosis within a small gastric venule or arteriole, and that the response to intravenous therapy is better than to any other method of treatment. The possibility of influencing the healing of chronic ulceration by improvement of the circulation is certainly one that deserves investigation.

THE STRANGEWAYS COLLECTION

THE Strangeways collection of rheumatic joints is part of the fruits of some nine years' research by the late Dr. T. S. P. Strangeways into the problems of chronic arthritis. When Strangeways died in 1927 his collection, consisting of about 250 specimens, was transferred to the museum of the Royal College of Surgeons of England, and Mr. R. Lawford Knaggs took in hand the task of examining and describing it. He has recently reported [1] his observations and conclusions regarding the nature of chronic rheumatoid conditions. His observations are necessarily confined to the morbid anatomy and histology of the lesions, but the conclusions have an important bearing on the general problem of these diseases. Early in his researches he was struck with the difficulty of distinguishing between osteo-arthritis and rheumatoid arthritis. Features characteristic of the one disease often occurred in specimens of the other; and cases were found in which the two diseases seemed to merge into one another. He has come to the conclusion, therefore, that the difference between them is largely a matter of different reacting powers in articular tissues. Osteo-arthritis, he points out, is a disease of the robust type of person, and appears to be the reaction of a highly resistant tissue, whereas rheumatoid arthritis is a disease of the delicate and enfeebled and represents the final reaction of devitalised tissue. Gout he takes to be a disease of a similar nature to osteo-arthritis and rheumatoid arthritis for, without the urate deposits, it is almost indistinguishable from them. He postulates in gout a double toxic attack, first from the toxins common to chronic rheumatoid affections in general, and, secondly, from the toxins associated with disordered purine metabolism. Likewise he considers Charcot's disease of joints to be another anatomical representation of the above diseases, but one in which the degenerative changes are especially widespread; the absence of pain allows freer movements, and consequently more extensive destruction of the joint tissues. He thus takes the circulation of toxins in the body to be the essential factor in all these diseases.

The attempt to unify these pathological conditions in this way is a considerable improvement on the old tendency to confuse classifications by a multiplicity of fine, and often totally short-sighted distinctions. Although Knaggs has very properly refrained from attempting to draw conclusions about the nature of the toxins concerned, he has done something towards clearing the ground for a concentrated attack on a problem which is beginning to occupy the special attention of health authorities in many countries.

[1] Brit. Jour. Surg., 1932–33, xx., 113, 309, and 425.

BARBITURIC HYPNOTICS

As our Berlin correspondent wrote recently experience continues to favour the use of another barbituric acid compound as a basal narcotic, capable also of being used as a complete anæsthetic by itself. This is called Evipan-natrium, and is a salt solution of c-c-cyclohexenylmethyl-N-methyl-barbituric acid. Pharmacologically it has been investigated by Prof. H. Weese, and most favourably pronounced upon.[1] Fortified with this testimonial, Prof. W. Baetzner employed the new substance on 400 patients operated on for a great variety of surgical troubles of which more than half were abdominal. This surgeon expresses himself [2] as greatly pleased with evipan-natrium, both as a safe and rapid inducer of unconsciousness, as an anæsthetic for short operations, and as a perfectly efficient basal narcotic in conjunction with ether or ethyl chloride, or presumably any other inhalation anæsthetic. The new drug has been used only intravenously. A 10 per cent. solution is employed and 3 to 6 c.cm. are injected, the injection taking from one-half to one and a half minutes. The dose is regulated by the effect produced, not by body-weight. Generally the patient is unconscious by the end of a minute. If no other anæsthetic is to be given the injection is continued till about 10 c.cm. are injected; or a second injection is made when signs appear that the first effects are waning. There were two or three instances of violent excitement in the early stages, but these were attributed to underdosage; and there were a few instances of convulsion in the experience of C. Holtermann, who has used evipan-natrium in 700 gynæcological and obstetric patients. Both these authors, however, regard the drug as a most valuable addition to the list of anæsthetics. They declare it to be safe, to produce little effect on breathing or blood pressure, and to be free from deleterious after-effects. One of them says that with regard to children he has hitherto had little experience. Intravenous methods, however, are not generally the choice for quite young subjects. If all that is said of this new compound is confirmed by further experience it will be a serious rival to nembutal with those who choose intravenous injection.

The most recent account of the use of sodium amytal at confinements does not encourage the hope that the barbiturates have provided the ideal anæsthetic for use in labour. The restlessness which has hitherto been the drawback to these drugs for maternity work, especially when used intravenously, is still a formidable detriment. J. T. Swendson found [3] that this symptom in 56 per cent. of his 64 cases was so marked that the patients needed constant watching, 28·2 per cent. were slightly restless, and the rest quiet. This

[1] Deut. med. Woch., Jan. 13th, p. 47.
[2] Ibid., p. 48.
[3] Minnesota Medicine, December, 1932.

observer used sodium amytal by the vein or by the mouth, or in both ways. On the whole he prefers large doses by the mouth, except in primiparæ, for whom he chooses the venous route. In many instances he supplements the barbiturate with nitrous oxide or ether, and they appear then to have little superiority over the more familiar early dose of chloral in good amount. W. F. Abbott working with nembutal intravenously found [4] that 70 to 80 per cent. were extremely restless, or even violent during uterine contractions. He points out that though this restlessness demands the constant attendance of a nurse, this is true of any patient under anæsthesia, and the "lack of memory of labour pains is surely compensation for the small additional expense." The restlessness can be lessened by using sedatives which act on the cerebral cortex, but these can be employed with safety only in the early stages of labour. The combination of chloral with nembutal has been shown to give excellent results. It seems plain that from the point of view of the patient the barbiturates are a valuable help in obstetrics, for they are safe within wide limits of dosage, and the amnesia they provide is unquestioned. Moreover, no ill-effects on the child have been reported and, so far as we are aware, none in the mothers of a serious nature. Some patients have exhibited skin eruption of an irritating kind, but these have not been of long duration. For the man who has to work single-handed, or with a nurse but no anæsthetist, the barbiturates seem to be a very helpful addition to the obstetrician's pharmacopœia. The ideal of course is to have an anæsthetist present, and gas and oxygen used during the pain. This with a little ether at the most critical time is the method which leaves patient and child in the best possible state after the birth is over.

THE INTERPRETATION OF CHEST RADIOGRAMS

THE interpretation of radiograms is more difficult in the chest than in any other part of the body. This is due partly to the absence of opportunity of operative control, and partly to the fact that owing to the depth of the chest confusion arises through the super-imposition of shadows of different structures. Even on so fundamental a point as the cause of the normal lung-markings unanimity has not been reached. Dr. T. Dale [5] has shown that after the injection of abrodil these shadows are intensified, and deduces that they must therefore be caused by the blood-vessels and not by the bronchi. The small round shadows would thus indicate neither calcified tuberculous foci nor enlarged glands, as is commonly supposed, but blood-vessels whose axes lie in the direction of the rays. Enlarged glands, in fact, only exceptionally throw shadows on the film. In order the better to interpret radiological appearances in terms of pathological processes Dr. Dale has investigated various diseases of the chest by taking films shortly before and after death, and stereoscopic films of the lungs removed from the body and inflated by a technique of his own to their normal size. The films taken in these different ways are compared with one another and with the post-mortem findings. More reliable information regarding the site and nature of lesions is given, he claims, by these stereoscopic films than by serial sections of the lungs. His main conclusions are as follows. The different types of tuberculous disease, apart from the miliary, cannot be distinguished by a single radiological examination, since most cases present the disease in a mixed form. Even very large cavities may be rendered invisible by the surrounding infiltration and when visible may be difficult to distinguish from pleural rings except on stereoscopic examination. Pleural rings, which have caused so much controversy, are due to a zone of compressed alveoli surrounding subpleural emphysematous areas. Caseating foci surrounded by granulation tissue appear as clear areas within irregular walls and may resemble bronchiectatic cavities. The shadows cast by miliary nodules are due partly to the nodules themselves and partly to the hyperæmic zones by which they are surrounded. Variation in the density of different nodules in the same film is due to the super-imposition of nodules which lie in the same path of the rays. In children the primary focus (of Ghon) cannot always be identified with certainty. Broncho-pneumonia in many cases cannot be distinguished from tuberculosis or from hæmorrhages due to acute leukæmia. The book is profusely illustrated with plane and stereoscopic radiograms, and the observations of others are discussed in detail. The criticism may be made that this research appears to concentrate attention too much upon the terminal stages of disease; but the conclusions drawn can be applied in great measure to the earlier stages. Dr. Dale has undoubtedly advanced radiology of the chest a step further in precision.

CELLULAR REACTION TO T.B. PARTIGENS

DURING the last two or three years a team of American workers, researching under the auspices of the National Tuberculosis Association of America, have concentrated on the cellular reactions of the tissues to chemically pure fractions of the tubercle bacillus. The plan has been to select standard strains of organisms, which had been grown in large quantities on synthetic media, and to test biologically the various chemically pure fractions which had been previously analysed by biochemists. Numerous strains have in this way been investigated. Dr. F. R. Sabin's contribution to this study [1] has been an investigation of the cellular reactions to tuberculous lipoids and polysaccharides. The first substance used was a tuberculo-phosphatide, a soft white granular substance which under crossed Nicol prisms was found to be predominantly crystalline. This phosphatide has another important property, for when distilled water is first applied to it, it breaks up into typical myelin figures which can be identified after the material has been phagocyted. In the fresh state this myelin material stains faintly pink in neutral red, and after it has been taken into the cells this characteristic stain is retained for a time. In rabbit tissues it was found that the phagocytic cells secreted a fluid round the myelin-like masses and obscured the lipoidal material, whereas in the guinea-pig the cells were found engorged and distended with entirely unchanged myelin-like masses. Experiments were made with omental tissue to determine which type of cell of the connective tissues phagocytes this material. The so-called milk spots of the normal omentum are composed of monocytes and young connective tissue cells with some lymphocytes and an occasional branched clasmatocyte. In the interstices between the milk spots are scattered branched cells of the macrophage or clasmatocyte type. The latter engorge themselves with any particulate material.

[4] Canad. Med. Assoc. Jour., December, 1932, p. 620.
[5] Der Wert der Röntgenuntersuchung in der Lungendiagnostik; ein röntgenologisch-anatomischer Vergleich. By T. Dale. Acta Radiologica. Suppl. xvi. Stockholm. 1932. Pp. 111. Swed. cr.10.

[1] Studies from the Rockefeller Institute for Medical Research. Reprints. Vol. lxxxii. New York: Rockefeller Institute.

The mass of material which these big-eater cells will take up is important in determining their functional nature as compared with monocytes of the milk spots which take up only a small amount of foreign material.

The tuberculo-phosphatide when injected into the peritoneal cavity was found to be taken up by the big-eating clasmatocyte only in small amounts, but was absorbed in such large amounts by the young connective tissue cells and monocytes that the milk spots appeared swollen to the unaided eye. When studied with supravital staining methods the cells which engorged the material were found to break into finer and finer particles in three stages: (1) cells with largest vacuoles filled with phosphatide either intact or slightly changed (a phosphatide cell); (2) cells showing cytoplasm filled with a rosette of many coarse vacuoles, uniform in size, making the cell appear to have a foamy cytoplasm (the coarse vacuolated epithelioid cell); (3) a cell with a rosette of such tiny vacuoles that the cytoplasm appeared dense and nearly uniform in structure (the typical epithelioid cell). This third stage is reached in the second week. With repeated intraperitoneal injections of the phosphatide there was a marked maturation of the monocytes and production of epithelioid cells in such numbers that the outlines of the milk spots became obscured. It seemed clear, therefore, that the epithelioid cell was the characteristic response to tuberculo-phosphatide, and was associated with phagocytosis. Other immediate reactions were minimal and consisted only of a transient emigration of leucocytes from the tissues. The epithelioid cell of the third stage has the same type of rosette in the supravital staining reaction as the Langhans giant cell. It is a multinuclear epithelioid cell, whereas the so-called foreign body giant cell is a reaction to foreign material by fusion of cells, usually monocytes. Caseation and infiltration of lymphocytes forming complete capsules followed as in the ordinary natural infection. Dr. Sabin considers that caseation is the end stage of the epithelioid cell, the infiltration of the leucocytes being secondary to the death of this cell. He regards these changes as the specific reaction to the phosphatide, and such other reactions as migration of leucocytes from the blood-vessels, their phagocytosis and destruction by clasmatocytes, the development of plasma cells, the increase in lymphocytes, in young connective tissue cells, in fibroblasts, and the development of new blood-vessels as non-specific reactions.

An unknown fatty acid of high molecular weight and designated phthioic acid was next used. This was the only substance isolated from the original fatty acid of the bacillary material which produced a response of tubercular tissue. Its empirical formula is $C_{28}H_{56}O_2$. It is a heavy oil and much too irritating to be used undiluted, causing necrosis and complex response. When diluted with mineral oil it gave a diffuse reaction of epithelioid cells of the typical third stage described above. Further researches showed that the specific activity towards the production of epithelioid cells was only produced by a dextrorotatory acid obtained by the fractionation from the phthioic acid. Next an unsaponifiable wax, believed to be a higher alcohol with the formula $C_{84}H_{168}O_4$, was tested. The cellular reaction produced to this unsaponifiable alcohol showed undifferentiated connective tissue cells and leucocytes. Lastly an acetone-soluble fat was used. This produced by far the most complex cellular reaction of the substances tested. There was a diffuse reaction of epithelioid cells as in the case of fatty acids, but in addition there was a general infiltration of the tissues with leucocytes, an increase in undifferentiated connective tissue cells, fibroblasts, lymphocytes, plasma cells, and a marked increase in new blood-vessels with hæmorrhage.

All these tests with tuberculous lipoids therefore suggest that both the tuberculo-lipoids are remarkable stimulants of the cells of connective tissue. Some of them, such as the phosphatide, act as a foreign body and produce effects by phagocytosis; others, such as the unsaponifiable higher alcohol, act as a stimulant without being phagocyted; whilst yet a third, the acetone-soluble fat, is an extremely complex irritant. The explanation of the cellular reactions in tuberculosis are to be found, the author considers, in all these reactions, the epithelioid cell being the result of phagocytosis of a tuberculo-lipoid by monocytes and young tissue cells. Lastly, Dr. Sabin found that polysaccharides obtained from lipoids and from the whole bacillus produced migration of leucocytes from the blood-vessels and damaging of them so that they were quickly phagocyted by clasmatocytes. This was a constant reaction regardless of the number of injections. Although there is no fraction of the tubercle bacillus which does not produce this reaction to a certain extent it was considered to be so consistently found with all the polysaccharides as to raise the issue as to whether the material in the other fractions may not be the content of carbohydrate.

The protein fraction from tubercle bacilli is responsible for the reactions that give the skin test, a reaction common to all other proteins, but a particularly sensitive one in the tuberculous animal. Given in sufficient doses this fraction produces a rise of temperature, then a rapid fall of temperature followed by death. The cellular reaction produced thereby appears to be mainly a proliferation of plasma cells with damage to the endothelium of the blood-vessels causing hæmorrhage.

THE QUANTUM THEORY OF INFECTION

It is now nearly five years since Brevet-Colonel C. A. Gill, I.M.S., brought out his book entitled the "Genesis of Epidemics," based largely on experience as director of public health in the Punjab.[1] The report of the department for 1931, now before us, is the last for which Colonel Gill will be responsible—he has been transferred to Burma on promotion—and it is interesting reading in the light of a theory of epidemicity to which in his book he gave the name of the quantum theory. Nature in general exhibits a remarkable unity of design, and one would not expect to find a separate mechanism of epidemicity in each specific disease. Plague, cholera, small-pox, malaria, influenza, and the rest may display many distinctive clinical and epidemiological features, but they all show a similarity in periodicity and seasonal incidence, in wave form, diffusibility and toxicity, and in their special incidence upon certain age-groups; these are the genetic features of epidemic disease. If, he argued, a unitary mechanism can be postulated for all epidemics, then several important implications follow. (1) The intensive study of any single epidemic disease will throw light on the general law. (2) General laws may be deduced from specific instances. (3) Investigations in connexion with animals and plants may elucidate problems of human epidemiology. (4) The complexity of problems of epidemic causation and investigation is simplified. The basic principle of the quantum theory is that all epidemic manifestations are the outcome of loss of equilibrium between the dose of toxin and the degree of resistance of the subject. Colonel Gill could discover four factors in the mechanism of an epidemic: the reservoir of infection, the parasite factor, the immunity factor, and the transmission factor—the last being of predominant importance. A prolonged interruption of transmission would naturally be followed by a sudden increase, given favouring circumstances in which meteorological and atmospheric conditions play a

[1] See THE LANCET, 1928, ii., 655.

large part. The Punjab offers exceptional opportunities for the intensive study of epidemics of malaria, and the quantum theory works out thus. Regional epidemics are mainly dependent on unstable climatic conditions. For prolonged periods these may be unfavourable to transmission, with the result that immunity is lowered. Then comes an exceptional monsoon, with a complete change of climatic and atmospheric conditions, and the transmission factor suddenly becomes favourable; conditions are suitable for insect life, a vast increase of anopheles mosquitoes occurs, and the opportunities for transmission are greatly enhanced. High temperature and increased humidity are not only conducive to the metabolic activity and longevity of the insect host; they also favour a rapid completion of the sexual cycle of the parasite in the tissues of the insect, and an acceleration of the intracorporeal phase. There is thus a rapid multiplication of the infective cycle. The intensity of an epidemic is influenced by the number of persons exposed, and since mortality is mainly amongst infants and young children the average age of the population is important. In the Punjab the birth-rate is high (40 to 50 per mille), and the average duration of life low (35 years). The well-being of the population is also important; one of Colonel Gill's main contentions has always been that an under-nourished community is particularly liable to malaria; improved nutrition is accompanied by a lessened susceptibility. A crucial test of the theory would be provided if it were shown that epidemics can be predicted with precision. It was stated in 1928 that six forecasts had up to then been prepared; the data employed in forecasting were the humidity or rainfall factor, the spleen rate, the economic factor (as represented by the average price of food grains), and the coefficient of variability of fever mortality. In each case the intensity and distribution of the disease were accurately predicted.

TUBERCULOUS MENINGITIS

TUBERCULOUS meningitis is so commonly found in association with miliary tuberculosis—especially in childhood—that it has been generally assumed to arise from a blood-borne infection of the meninges. Not every case of miliary tuberculosis, however, shows a coexistent meningitis. It has long been recognised, moreover, that the meningitis is occasionally caused by direct spread of the infection from a caseous focus in some neighbouring structure, such as the brain or one of the bones of the skull; and the meningitis so produced is morphologically identical with that found in most cases of miliary tuberculosis. These facts have led A. R. Rich and H. A. McCordock [1] to study the pathogenesis in more detail, and they have confirmed the observation that, while intravenous and even intracarotid injection of massive doses of tubercle bacilli experimentally will always produce a generalised miliary tuberculosis, it very rarely causes a meningitis. In the few exceptions to this rule the meningitis develops some time after the injection, and it can usually be shown to have spread from an older local caseous focus. On the other hand, injection of tubercle bacilli directly into the meninges was always followed by an intense meningitis with all the characteristics of tuberculous meningitis in man. The next step in Rich and McCordock's inquiry was to examine the brain and spinal cord in 82 cases of tuberculous meningitis. The material was cut into slices 3–5 mm. in thickness and the slices were carefully examined for small caseous foci. In 75 of the cases such foci, which had ruptured and discharged into the cerebro-spinal fluid, were found in the brain or meninges; in a further 2 cases there were discharging foci in the choroid plexus and in the vertebræ; while in the remaining 5 cases the material available for study was incomplete. These investigations indicate that diffuse tuberculous meningitis is not a direct result of a blood-borne infection, but is the result of discharge of tubercle bacilli into the cerebro-spinal fluid from adjacent caseous foci.

[1] Bull. Johns Hopkins Hosp., January, 1933, p. 5.

HEALTH OF THE NAVY IN 1931

THE statistical report on the Health of the Navy for 1931 [1] has just been issued. The total force was 87,075; the new cases and sick daily were more numerous, but there were fewer invalids and deaths. There were invalided: for phthisis 164, for errors of refraction 142, for diseases of the ear 66, for injuries 83, and 14 who refused operations. The largest cause of death was injury, total 83, of which 18 occurred in the loss of the submarine *Poseidon* in China; 19 died of pneumonia, 12 of meningococcal infection, 10 of pulmonary tuberculosis, 2 of other tuberculosis, 6 of suicide, and 7 of malignant disease (5 carcinoma, 1 sarcoma, 1 lymphosarcoma). A case of anthrax from a shaving-brush arose at Hong-Kong, but recovered after excision. One case of dysentery died in the Mediterranean; he had already had bacillary dysentery in 1926 and amœbic in 1929. Two cases of typhoid were seen at Shanghai, one had been inoculated preventively three months before, the other apparently two months after attack (but that is perhaps a misprint). Two cases of paratyphoid were seen in China, one in the Mediterranean; no other cases of the enteric group came to notice. Influenza attacked especially the Atlantic fleet and the Mediterranean station, but was less prevalent at home than in the Army in this year. Malaria is, we are told, treated with plasmoquine by the United Fruit Company in British Honduras and elsewhere, but no reports on the drug from ships are given. Of meningococcal infection 27 cases (12 deaths) occurred, 11 of them in the submarine and general depôts, whence also arose several cases of tubercle. The five cases of small-pox were all in China and all apparently well vaccinated; none died. Fewer men were infected with venereal diseases this year; China is still in this relation a grave danger. Chlorination of drinking water is progressing at Malta and all naval establishments will, it is hoped, soon have a safe supply. Swimming baths are tested daily with starch-iodine to secure just enough chlorination. Some 2000 civil cases of undulant fever occurred in Malta, but only 9 in the Navy; compulsory pasteurisation ashore of all goat's milk is being considered. Dick-testing and active immunisation against scarlet fever have been undertaken in *Britannia* and *St. Vincent*; of the cadets in the former 55 per cent. were found to be susceptible, only 24 per cent. in the latter. Against diphtheria 238 ratings were immunised; there were fewer cases of both diphtheria and scarlet fever this year. A solarium was taken into use on the surgical side of Plymouth Hospital, and another on the medical side will soon be ready. At Chatham Hospital methylated spirit is being used for sterilising the skin, with excellent clinical results and with great economy. Inquiry is proceeding at Chatham into the increase of gastric and duodenal ulcers in the service. Many vaccines for the service are prepared

[1] Statistical Report of the Health of the Navy for 1931. H.M. Stationery Office. Pp. 147. 2*s*. 6*d*.

at the naval medical school at Greenwich, gonococcal vaccine at the naval hospitals. Men nowadays present themselves for dental treatment; neglect is rare, and the condition of the men's teeth goes on improving. The highest proportional number of cases of injury and accident in any ship was in the gunboat *Teal* in China (2·7 per 1000), the next in the cruiser *Cumberland* on the same station, 1·85; for all ships 0·5 might be an approximate average.

Except for influenza, which may on any one day disable a ship, and venereal disease, a constant canker and loss of service, the most important source of loss to the Navy at present seems to be tuberculosis, with its large death and invaliding rates; it was described, in a recent publication of the International Labour Office, as an occupational disease of seamen. Pneumonia had double the death-rate but caused no invaliding, and appeared to be entirely unrelated to tuberculosis in its distribution. Much has been done to reduce the prevalence of tubercle in the Navy, much is still to do. Fifty years ago, when the tubercle bacillus was unknown, the number of cases, invalids, and deaths were double or more the present rates; half the men in the Navy then were under 25, and cases occurred mostly among the young; now the Navy is older, and it is the older men suffer more. In the five years to 1913 the incidence was 2·58, but in the five to 1930 it was 2·31; a small improvement which seems to apply to all classes. It seems that writers, stewards, and cooks, taken together, had in the five years 1927–1931 a phthisis-rate of 2·8, telegraphists 2·3, marines 2·2, seamen and engine-room staff 2·1. The sick berth staff in 1909–1913 had a rate of 6·8; now it is 1·5. The submarine and destroyer depôts have higher figures (over 3), but their submarines show no cases and their destroyers but 1·29. From pulmonary tuberculosis the Navy's wastage (164 invalidings and 10 deaths) was 174, the Army's was 201 (181 and 20), and that of the R.A.F. was 19 (19 and 0); in all 394. The average age of the Army and R.A.F. was about 23, of the Navy 28. How was it the R.A.F. got off so lightly?

DR. EUGEN COHN

WE regret to announce the death at the age of 72 years of Geheimer Sanitätsrat Dr. Eugen Cohn, who for many years, both before and since the war, acted as our correspondent in Berlin. Dr. Cohn was of an old Berlin family, and after qualifying in medicine with distinction did post-graduate work at Vienna, where he acted as assistant in the psychiatric clinic of Prof. Meinert. Subsequently two voyages as medical officer in the service of a Dutch merchant marine company took him to Java and Sumatra, and on his return to Germany he became assistant to Prof. Hahn, the chief medical officer of the Friedrichshain Municipal Hospital in Berlin. That position he occupied for four years, when he started consultant practice. He now showed close interest in the treatment of occupational diseases, especially those prevailing in the clothing, paper manufacturing, and book printing industries, and as medical attendant to the Bookprinters' Trade Association he was in charge of an out-patient department which he fitted up with modern apparatus. His comprehensive medical knowledge and good memory were reinforced by considerable linguistic accomplishment, and there are few countries in Europe to which at different times he did not pay one or several visits, his special predilection being England. He collected a large library dealing with our political institutions, and had the main events of our history at his fingers' ends. We have lost in Dr. Eugen Cohn a valuable and valued collaborator.

NEW YORK ACADEMY OF MEDICINE

THE recent elections to the Honorary Fellowship of the Academy formed a striking picture of international relations in medicine. The thirteen persons honoured by the Academy represent nine different nationalities. The new Fellows are: Sir Henry Dale, Prof. F. G. Banting, Sir Charles Ballance, Prof. C. Achard (General Secretary of the French Academy of Medicine), Prof. Allessandri (Director of Clinical Surgery at Rome), Prof. Foerster (the famous Breslau neurologist), Prof. Forssell (Director of Radiological Study at Stockholm), Prof. Kappers (Professor of Comparative Anatomy at Amsterdam), Prof. Vogt (Director of Ophthalmological Studies at Zürich), Prof. Wenckebach of Vienna, Prof. Minot of Harvard, Prof. W. G. Spiller (Consulting Neurologist at the Philadelphia General Hospital), and Prof. Herrick of the Rush Medical College. There is no need to enumerate in any further detail the claims which the new Fellows have upon international recognition—their names proclaim them.

ON Tuesday last, at the annual meeting, held in Liverpool, of the Merseyside Hospitals' Council, which controls a penny-in-the-pound fund, it was reported that an agreement had been reached with the Hospitals Medical Staffs Association, providing for an annual staff payment of 7 per cent. on distribution to hospitals up to £90,000, with a maximum payment of 10 per cent. should this ever reach £150,000. The income of the fund for 1932 was nearly £142,000 and the total distribution was about £116,000. The amounts distributed were: to 21 associated voluntary hospitals, £84,137; to medical staffs funds, £5460; to other voluntary hospitals, £7567; and to public assistance hospitals, £14,559. The associated hospitals had an estimated deficit of £39,000 at the end of 1932, and it is recommended that either the rate of contribution to the fund be increased, or that the fund shall no longer accept financial responsibility for the contributors admitted to public assistance hospitals.

Prof. Beckwith Whitehouse will preside over the ninth British Congress of Obstetrics and Gynæcology, to be held at Birmingham from April 5th–7th. The chief subject of discussion is the Uterine Action and its Abnormalities; Mr. Aleck Bourne will introduce it and the other speakers will include Mr. L. Carnac Rivett, Prof. W. Blair Bell, Dr. T. N. Jeffcoate, Dr. M. M. Datnow, and Dr. J. M. Robson. The official guests of the congress will be Prof. Oskar Fraenkl, of Vienna, and Prof. A. H. M. J. van Rooz, of Amsterdam. The honorary local secretary is Mr. W. E. Barnie-Adshead, 89, Cornwall-street, Birmingham. The British College of Obstetricians and Gynæcologists will hold its annual meeting during the congress.

OXFORD OPHTHALMOLOGICAL CONGRESS. — On Wednesday, July 5th, this congress will assemble at Keble College, Oxford, for its twenty-third annual meeting, under the presidency of Mr. Cyril H. Walker, the Master. On the 6th Dr. S. Holth (Oslo) will open a symposium on the Treatment of Glaucoma, excluding operative details. On the 7th Mr. Bernard Cridland (immediate past Master) will deliver the Doyne memorial lecture, and Mr. Affleck Greeves and Mr. Frank Law will open a discussion on Diathermy in Ophthalmology. Further particulars of the meeting may be had from Mr. C. G. Russ Wood, the hon. secretary and treasurer, Hill House, Abberbury-road, Iffley, Oxford.

SPECIAL ARTICLES

B C G VACCINATION AGAINST TUBERCULOSIS

PROF. CALMETTE'S REPLY TO THE MINISTRY OF HEALTH

A SESSION of the permanent committee of the Office International d'Hygiène Publique, held in Paris last spring, took into consideration the use made of B C G vaccine in different countries, and Sir George Buchanan, as delegate for the United Kingdom, presented a note epitomising the English position on the administrative and official side.[1] Prof. Calmette has replied to this note in a letter addressed to Sir George Buchanan, with a request that his views should be communicated to English readers through our columns.

Sir George Buchanan's Note

B C G prophylaxis, said Sir George Buchanan's note, has made no progress in the United Kingdom. No system of supply of B C G for this purpose has been organised by the Government departments concerned or by the local authorities who are responsible for measures of control over tuberculosis; the medical advisers of these authorities, central or local, do not advocate that this should be done, or that the use of B C G should be officially promoted; and, broadly speaking, they do not find that the position which they take in the matter runs counter to instructed medical or popular opinion in the country. In taking this position in England (one may speak here of England for convenience, as similar considerations have weight with the health authorities in Wales, Scotland, and Northern Ireland) we do not fail to realise that in many other countries, particularly in Europe, B C G prophylaxis is one of the most noteworthy of contemporaneous medical procedures; that it is held by many high authorities in medicine and hygiene to have already justified itself in certain countries by substantial saving of life and sickness. Every responsible public health authority is thus bound to take the possibilities of B C G into the fullest consideration, and to do so not only in the light of research but also of the practical experience gained in the countries where this prophylaxis is in active operation. Certainly we feel these obligations in our country in which so much work has been done to determine the distinctions and interrelations of different strains of tubercle bacillus, and so much expert attention is given to and public expenditure incurred on tuberculosis control.

On the side of our research into B C G I need not, Sir G. Buchanan said, repeat the observations of Dr. A. S. MacNalty, presented to the committee in May, 1931.[2] Investigations are being continued on these and other lines and published as completed. Among the more recent has been the work of Stanley Griffith and Buxton on calves which gives evidence that B C G can, when given in an appropriate manner, confer a high degree of immunity upon animals of this species against an experimental or a natural infection with tuberculosis. Administratively, our present position may very conveniently be illustrated by reference to the circular, issued by the central Administration de l'Hygiène to the Belgian medical faculty at the end of last year, setting out admirably the conditions under which the supply and use of B C G are thought desirable in a European country and are being arranged for nationally.

B C G BY MOUTH TO CHILDREN EXPOSED TO INFECTION

It is the essence of the system, as is well explained in the Belgian instructions, that the newly born child, if it is to obtain benefit from the B C G, should at once, and for a period of at least four weeks, be taken into an environment where no tuberculous infection is likely to reach it. If after that the infant goes back to infection in its home, it is likely, for a short time at least, to be more resistant to the infection it meets with there. When, however, the fullest weight is given to this possibility, the advantage which the adoption of the system in England would give us is not great. To obtain supplies of B C G from the centre, the doctor dealing with the case must obviously notify the tuberculosis in the household, if he has not done so already. But the local health authorities, when made aware of the existence of tuberculosis in the household, proceed as a matter of course to take any action necessary and possible in regard to all contacts. As MacNalty has shown[3] the mortality from tuberculosis in the younger age-groups has been diminishing with great rapidity in recent years. Under the age of 1 year the total deaths in England and Wales attributed to tuberculosis (all forms) were no more than 585 in 1930; in 1921 the corresponding figure was 1311. The newly born child who is a contact thus receives attention already under our system. If removal from the tuberculous household is essential, owing to the circumstances of the tuberculous patient and the household, such removal will be advised or assisted, not merely for a few weeks to enable the infant to get the transient benefit of any preventive effects which giving B C G by mouth may secure, but so long as the danger of its receiving massive infection at its home persists. If, on the other hand, it is impossible in the circumstances to take the infant away from the household and the chances of such infection, then the use of B C G is no longer a practical question, since, as explained in the Belgian circular, B C G would be useless under such conditions. It will be readily understood that in England, before advice can be given to local health authorities profoundly to modify their system of tuberculosis control and to make new and special arrangements for the B C G-treated infant, we should require something more to justify our action than a statement that there is a presumption that B C G, when given by mouth under optimum conditions, protects for a short period against an infection of moderate intensity. But this is the most and the best that can be said for it; no one contends that B C G presents any analogy to anti-variola vaccine, where one really could be taking away the newly born infant for a few weeks, returning it after vaccination in such a condition that no after-exposure to infection, however intense, would affect its health.

B C G SUBCUTANEOUSLY TO ADOLESCENTS OR ADULTS

There is definite experimental evidence, in cattle, that inoculation with B C G can confer some protection or resistance against subsequent infections by the ordinary infecting varieties of tubercle bacilli. Further, there is some presumption that B C G given subcutaneously may also protect against delay

[1] A French translation of this epitome appeared in the Bulletin of the Office International, 1932, xxiv., 1643.
[2] Bull. Off. Internat., 1931, xxiii., 1821.
[3] Ministry of Health. Reports on Public Health and Medical Subjects. No. 64. 1932.

or minimise the effect of tuberculous infection in man. No one could under-rate the value of a method by which persons, like young nurses beginning duty in a tuberculosis hospital or sanatorium, or young adults or children coming into urban conditions from remote places where they have not previously been exposed to tuberculosis infection, could be thus protected, if only for a short period, in their new surroundings. But assuming that the power to confer this protection were definitely proved, and not merely a plausible assumption, there would still be considerable limitation in applying it in practice, as the Belgian circular shows. The person who proceeds to the town, or to the occupation which will expose him to tuberculosis, must have known sufficiently long in advance what was going to happen to him; he must have had the foresight to get medical opinion some months before, and have been found negative to tuberculin tests. Then again, well in advance of his going to his new occupation, he has to be inoculated with B C G, with a prospect that he may be among the substantial minority in which the inoculation is followed by the formation of a lump under the skin, and possibly by a subcutaneous chronic abscess of localised tuberculous lesion lasting for months. For the healthy adult who has never considered tubercle, or for the child, these proceedings are not too easy for public authorities to advocate or expect to be voluntarily accepted. The case is indeed far removed from that of the unvaccinated person going into a smallpox-infected country. The latter, even though he can be assured of lasting protection against small-pox, sometimes requires much persuasion before he will submit to the inconveniences and remote risks of vaccination. One is not justified at the best in claiming more for the inoculation of B C G than that there is some prima-facie evidence to show that it is a useful temporary precaution to take.

"I may conclude," said the British delegate, "that Government or local public health authorities in England do not consider themselves justified in exercising any pressure, direct or indirect, on the individuals concerned in order to secure their treatment with B C G vaccine. Nor does there seem sufficient reason for these public health authorities to make special arrangements to provide B C G in present circumstances. There would be some risk indeed that by so doing we should detract from the efficacy of other measures of control in which we have greater confidence."

Prof. Calmette's Reply

"I consider it my duty," Prof. Calmette writes, "to address this letter to you, and to have it published as a proof of my esteem for your great country and of my cordial feelings in regard to our British colleagues. I am sure you do not doubt the integrity of my scientific opinions and the total absence of any self-conceit on my side when human lives and science are concerned."

The decision not to recommend B C G vaccination in England is founded, he suggests, on the following arguments:—

(1) That tuberculous mortality in young children is decreasing steadily in Great Britain, and that this decrease has been caused exclusively by measures of hygiene, isolation of contagious patients, and improved social conditions.

(2) That it is difficult, and often impossible, to separate vaccinated babies from their contaminated families, although this is the essential condition of success in B C G vaccination.

(3) That it has not yet been established how long a child, vaccinated with B C G, may resist subsequent virulent infections.

(4) That it is feared the introduction of B C G vaccination would impair the efficacy of the usual measures of prophylaxis, in which the governmental and local authorities have the greatest trust.

Prof. Calmette then sets himself to examine the validity of these arguments in the light of known clinical and experimental facts.

1. DIMINISHING MORTALITY

The death-rate from all causes during the first year of life may have decreased, as the Table shows, more rapidly in England than in France during the past 30

Death-rate during the First Year of Life per 100 Live-born Children

	England.	France.
1901	15·2	14·2
1911	13·0	15·9
1921	8·3	11·6
1931	6·6	7·6

years, but there has been no notable decrease of the death-rate from tuberculosis between the ages of 15 and 40 years either in England or in other countries of Northern Europe, and the number of infected persons giving a positive reaction to tuberculin is probably the same to-day as it was 20 years ago. The number of British subjects dying from tuberculosis is still very high—for instance, 8206 individuals from 15 to 25 years old out of every 100,000 living in 1929 died from tuberculosis. Moreover, A. Stanley Griffith and J. W. S. Blacklock have shown recently that many people (more that 2000 each year) die from bovine tuberculosis. And F. J. Bentley has computed the formidable expenses caused by the treatment of tuberculosis in all its clinical forms: about £600,000 a year in London alone. It seems hopeless, then, to try to eradicate tuberculosis by the ordinary measures of hygiene, which at the utmost result in a reduction of the number of sources of contamination and of acute tubercle in children.

But supposing it were possible to eradicate tuberculosis completely by the enforcement of some draconic system of segregation of bacilli carriers, the only way to maintain on the British Isles this hypothecated absence of tuberculous infection would be to cut off all relations with the rest of the world. The less virulent infections which cause tuberculin allergy (and immunity) in most adults would then become impossible, and after some time every British subject would be as receptive of tuberculosis as were the former inhabitants of countries where tuberculosis did not exist—negroes of Central Africa, Eskimos, Laplanders, natives of the Pacific islands. Inhabitants of Britain could no longer travel in Europe, Asia, or America, and no foreigners could be admitted without the Englishman running the risk of contracting tuberculosis like an African negro or a young infant who comes for the first time in contact with a source of tuberculous infection.

So to me it is rather Utopian to believe in the possibility of eradicating tuberculosis by measures of hygiene only, even if they were practicable on a large scale and the expenses not too heavy. The only measure that answers the purpose is preventive vaccination in a form as efficacious as a slight natural virulent infection, but yet harmless and easily put in practice. Nor will vaccination itself extirpate tuberculosis in the twinkling of an eye, but it will do so gradually if it is methodically used in all children immediately after birth. This is what B C G vaccina

tion aims at. In this it may be compared with Jenner's vaccine against small-pox and Pasteur's vaccines against anthrax and chicken cholera. These are all living vaccines. Killed vaccines such as those against typhoid, cholera, plague, or undulant fever give rise to only a transient immunity; only the presence in the human body of living tubercle bacilli, whether they be virulent or avirulent (B C G), renders it immune to tuberculosis.

2. SEGREGATION

Of course, in vaccination against tuberculosis, immunity does not appear immediately after the absorption of the vaccine; it needs some time for its establishment, just as in every other preventive vaccination. This incubation period varies in length from one disease to another. When a recently vaccinated child is exposed to massive virulent infection before the appearance of immunity one cannot reasonably expect it to be protected by the vaccine. B C G vaccination requires about five weeks for the elaboration of immunity. As a rule it is not difficult to secure that a vaccinated child born in a tuberculous family be kept apart night and day from the tuberculous patient for this short period when one has to do with intelligent people, and when the family in question is controlled by a visiting nurse. When the mother is tuberculous she must, of course, not suckle her baby. And even when this separation is not rigorous we learn from an experience of thousands of cases all over the world that B C G nearly always yields sufficient protection; for the death-rate from tuberculosis in vaccinated children who continue to live in infected families is only one-sixth of the death-rate from tuberculosis in non-vaccinated children living in the same conditions. This has been established by such scrupulous observers as William H. Park in New York, Heynsius van den Berg in Amsterdam, and Luiz Saye in Barcelona.

There is no reason why a child should not benefit by vaccination against tuberculosis when rigorous isolation is impossible; no more reason indeed than we should have to refuse to vaccinate the brothers and sisters of a small-pox patient staying in the same house. Of course, when a child is infected with tuberculosis before vaccination has had time to produce its effect, it will have been vaccinated in vain; but it would be wrong to prevent others from profiting by the method for that reason. Every citizen has a right to be protected from damage caused by others, and it would be an abuse on the part of the sanitary authorities to prevent him from exercising his rights.

3. DURATION OF IMMUNITY

This is really rather a weak argument! What do we know about the duration of immunity after vaccination against small-pox and the other infectious diseases? Only that it varies from one case to another, and that it may be prolonged by periodical revaccination. We know at least as much about B C G vaccination. The admirable observations of Debré, Lelong, and Pictet on babies put out to nurse under the control of Léon Bernard's organisation, have shown that vaccinated children remain more than five years resistant to virulent infection. And it has been proved that subsequent infection helps to maintain immunity in vaccinated individuals. On the other hand, it is easy to revaccinate a child every four or five years in order to maintain tuberculin allergy until beyond puberty. Such revaccinations are perfectly harmless.

4. NEGLECT OF OTHER MEASURES

The fear that the introduction of B C G vaccination would impair the efficacy of the usual measures of prophylaxis is unjustified. For the vaccination methods directed against rabies, typhoid, cholera, or plague, have never, as far as I know, in the least impeded the measures taken against mad dogs, filthy drinking water, germ carriers, or rat-fleas. On the contrary, the introduction of such methods has always encouraged rational and rigorous prophylaxis, and there is no reason why this should not be the case in tuberculosis. Everybody knows that even vaccinated people must not expose themselves to frequent or very abundant infections lest their immunity fail. And so it is to the interest of both parties, sanitary authorities and vaccinated public, that virus carriers be detected and controlled, as before, to avoid dangerous contact infection.

When preventive vaccination enters into daily practice by the free will of the public, people will claim protection against non-vaccinated infecting carriers, and sanitary authorities will see the field of their activity enlarged and not limited. Vaccination in the eyes of the public has the value of an insurance policy, and they do not want their privilege to be frustrated by the indifference of the authorities to this form of protection.

"What is left," Prof. Calmette concludes, "of the four objections which you formulated? Nothing but my conviction of having refuted them. Being in charge of one of the heaviest responsibilities that may weigh on a man's shoulders, you hesitate to recommend B C G vaccination until the last doubt of its harmlessness and utility has vanished from the minds of specialists the world over. That is your right. But to-day the question has been judged by the whole world. The new method has been prudently given a trial first, and adopted afterwards by a steadily growing number of convinced partisans. To-day large numbers of children are vaccinated with B C G in different countries, and everybody is satisfied with the method. It is stated everywhere that vaccination with B C G reduces the general infantile death-rate. Is it possible for Great Britain to refuse to let her subjects profit by the opportunity, gratuitously offered, of defending themselves more actively against the most murderous of human diseases?"

MEDICINE AND THE LAW

The Use of Experts

SOME weeks ago, while Mr. Justice Maugham was hearing a case in the Chancery Division, a five-page report by an architect and surveyor was put in evidence. "I am hoping," observed the judge, "that one day, in cases of this kind where reports are made by experts on each side, each side will hand the reports of its experts to the other side for consideration before the case comes on for hearing. Such a practice will effect a great saving of time, and I am hoping to see a reform of that kind before I leave the Bench." Something of the sort is now possible under Order XXXVIII.A in cases in the New Procedure List on the common-law side. The judge may order any question involving expert knowledge to a special referee for inquiry and report on terms that "the report, when received, shall be communicated to both parties with a view to ascertaining whether they are willing, before further expense is incurred, to agree

to accept the report in whole or in part." In particular the judge may so refer to a special referee any question as to the nature, extent, and permanence of an injury alleged to have been caused by the negligence of a party to the action. It seems, however, that the use made of this new facility has so far been disappointing. Properly applied, it would promote the early settlement of many cases before trial. It would save much time now spent by medical witnesses in courts of law and it would give cynics less opportunity to point out how doctors can differ.

The Prejudice against Lunatic Asylums

An odd case, noted in the *Law Times*, illustrates the old-fashioned horror of institutional treatment for mental disease. Under a will made in 1925 a man left the residue of his estate to his brother "on condition that my friends keep me out of a lunatic asylum." Under a proviso to Section 10 of the Lunacy (Ireland) Act, 1867, there was at that date in force a power for "any relation or friend" to take "under his own care or protection" (on entering into recognizances for the patient's peaceable behaviour or safe custody) any dangerous lunatic who otherwise would have to be compulsorily detained in the local authority's lunatic asylum under the section. Thus, whether the testator was aware of the fact or not, there was a statutory provision under which his friends could do him the service he desired. "If," added the testator in his will, "they allow me to be put into a lunatic asylum," then £700 of his residuary estate was to go to the British Home and Foreign Bible Society and the balance to the brother. Within two years of making his will the testator was detained for a month in the Londonderry Asylum on the information of a neighbour. Did this deprive the brother of the £700? The executors submitted the point to the court in Northern Ireland, the brother contending that the condition was invalid. He had been living in Queensland (as the testator well knew): he was unaware of the terms of the will and, if he had known of them, was not in a position to avert the detention order made many thousand miles away. The judge, however, upheld the condition. Such a stipulation is not invalid unless it is ineffectual or illegal; mere eccentricity or difficulty of compliance does not upset it. The court had to assume that the will was the work of a sane man. However absurd it might seem, the bequest was subject to a condition precedent, and the condition had been broken. Thus the Society took its £700.

The 1926 report of the Royal Commission on Lunacy and Mental Disorder dwelt on the atmosphere of suspicion and aversion with which mental treatment was invested. Patients and relatives alike, it declared, hated the idea of resort to an asylum. The 1930 Act, it is hoped, is dissipating that atmosphere. It even abolished by statute the invidious nomenclature of "lunatic" and "asylum," substituting (as the British Medical Association had suggested) euphemisms which avoid any stigma. The Northern Ireland Parliament made similar provision last year.

A Jury's Second Thoughts

The Coroners Act directs that, after hearing the evidence, the jury shall give their verdict and certify it by an inquisition in writing. There seems no reason why the jury should not alter the verdict at any time before they certify it in writing. The inquest is not closed merely because an announcement has been made in open court and members of the public have left the building in the belief that a final decision has been made. It is nevertheless unusual for a jury to change its mind as a Kent jury did at an inquest last week. If it is desirable that the verdict should be delivered publicly (as a decision in the Irish courts suggests), any amendment of it ought to have equal publicity. The Kent proceedings concerned the death of a patient who was being anæsthetised before an operation in hospital. By one of those unfortunate mistakes from which human actions will never be entirely free, a bottle had somehow been wrongly filled, and the bottle labelled "ether" contained chloroform. The original verdict of the jury, announced in open court, was as follows: "We find that the death was due to syncope accelerated by the administration of the wrong anæsthetic. No blame attaches to Dr. X or Dr. Y for believing the patient was fit to undergo the operation. We absolve Dr. Y from any blame for the administration of the wrong anæsthetic. He rightly assumed the contents of the bottle to be correct. We are of the opinion that the mistake in regard to the bottle was due to an error on the part of Nurse Z. The jury consider that in future stricter supervision in regard to anæsthetics should be observed, also that the sister in charge should give more definite instructions to her juniors in regard to the preparation of the vessels containing the drugs." After the announcement of this verdict the nurse whose name had been mentioned protested and collapsed in court. The coroner, when about to write out the record of the verdict, evidently regarded it as unfair to place on the record the name of the nurse: she was regarded as a thoroughly competent nurse, and she had stated at the inquest that she did not touch the ether bottle, which was already filled. He therefore gave the jury, through their foreman, the opportunity of recasting the verdict so as to omit the nurse's name. The jury accepted the suggestion. The coroner is reported to have then said: "What shall we call it?" Whereto the jury replied, "Misadventure." A verdict of "Death by misadventure" was then recorded. Even in its original form the verdict seems not to have been intended as one of manslaughter, since mere mistake or error of judgment does not amount to criminal negligence. It does not appear, therefore, that the jury's second thoughts affected any question of criminal liability. They merely eliminated words which need never have been inserted. There is, by the way, good authority for the rule that if the jury finds a verdict of manslaughter and gives particulars which show that the case is not one of manslaughter, the verdict will be quashed (R. *v.* Clerk of the Oxford Assize).

Some will think it a pity that coroner's juries do not confine themselves to a plain verdict without trimmings. Every coroner is aware of the tendency to long-winded verdicts even in simple cases, and (perhaps in the supposed interests of surviving relatives or other parties) to multiplicity of comment by way of rider. On the whole a long verdict is a bad verdict; the shorter it is, the less to revise. Still the jury has some justification. The Act says that their certified inquisition is to set forth, so far as such particulars have been proved to them, "who the deceased was, and how, when and where the deceased came by his death, and, if he came by his death by murder or manslaughter, the persons if any whom the jury find to have been guilty of such murder or manslaughter or of being accessories before the fact to such murder." There is, however, nothing here to necessitate the mention of persons who are not guilty.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

MENTAL DEFECTIVES AND STERILISATION

Dr. J. R. Bailey, medical superintendent of Gogarburn Institution, which is the chief Edinburgh institution for mental defectives, has lately been discussing deficiency in its relation to heredity. It had been calculated, he said, that if every mental defective in every generation were sterilised, it would still take 2000 years to stamp out the proportion of mental defect that was due to inherited taint. But inheritance was not the only factor concerned: disease and injury to the developing brain in infancy and early childhood was responsible at least as often, and produced the more severe grade of mental deficiency such as idiocy and imbecility, with epilepsy and paralysis as frequent concomitants. The defect that sprang from inherited causes was usually of the less severe type; the feeble-minded grade, who, in many instances, escaped observation or received no supervision after they left the special school. Sterilisation in these cases would, in his opinion, lead to an increase in sexual promiscuity and a rapid spread of venereal infection.

Greater care of the expectant mother, especially in the direction of ensuring that she had a well-balanced diet, rich in vitamins; greater attention to child life and health, especially in the earliest years; more intensive research into the cause and spread of disease affecting the nervous system—these were the methods, Dr. Bailey said, which would, slowly but surely, eliminate mental deficiency. They were the same as the measures that would build up a strong and virile race.

THE ADEQUACY OF MODERN DIET

In a lecture to the Edinburgh Women Citizens' Association, Dr. John Boyd Orr, director of the Rowett Research Institute, Aberdeen, said that an acre in Scotland now grew about five or six times as much as it did about a hundred years ago; and where formerly a cow gave 300 or 400 gallons or less, a good cow now gave over 1000 gallons. Improved transport made it possible for us to draw our food now from almost every quarter of the world. There was abundance of food, but the kind of food had changed remarkably. Up to the middle of the last century the people of Scotland were eating natural foodstuffs. With the introduction of machinery this had been changed. Instead of getting barley and oats, grinding them, and making them into bread, we now got white flour, polished rice, sugar, dried milk, and tinned foodstuffs. The natural foods had been changed into artificial foods with the very substances purified away that were necessary to perfect health. But a nation that could spend £1,000,000 a week on sweets and chocolate could very well afford the natural materials of good diet—plenty of milk, fresh eggs, fresh meat, fresh vegetables, fruit and sunshine, and whole wheat ground up. These were within the reach of most, especially skim milk, which contained everything except the fat, and yet was not regarded as an important item of diet.

GLASGOW ROYAL HOSPITAL FOR SICK CHILDREN

The Glasgow Royal Hospital for Sick Children celebrates its jubilee this year. The original hospital, projected in 1861, was completed in 1882 at a total cost of £13,000. There were 58 cots, later 74, and the annual cost of maintenance was £2000. To-day there are 300 cots and the annual cost of running them is £43,000. In the first year 300 children were treated; last year 5819 and 936 in the country branch. In 1907 the directors appealed for £100,000 to construct a new building, and raised the sum in a year. It was opened in 1914. This year the hospital closes with a balance on the right side, in spite of the depression.

IRELAND

(FROM OUR OWN CORRESPONDENT)

A CLEAN MILK BILL

THE Minister for Local Government and Public Health of the Irish Free State has informed a deputation from the Clean Milk Society that he will use all expedition in introducing a Bill dealing with the milk supply of the country. The Bill has been drafted and its provisions are being studied in detail by the officers of his department. It is nearly four years since the Minister's predecessor announced the provisions of a Milk Bill which was to be introduced as soon as possible, but, in spite of questioning by medical and other deputies interested in health the Bill never saw the light. The provisions, as stated, were somewhat drastic, and no doubt roused the opposition of the agricultural interest, always strong in the Dáil. It is satisfactory that the present Minister recognises the danger to the community from the present almost uncontrolled production of milk, and one may hope that he will not lose time before establishing adequate control.

UNITED STATES OF AMERICA

(FROM AN OCCASIONAL CORRESPONDENT)

MEDICAL STUDENTS ABROAD

THE strenuous and successful efforts made by the American medical profession during the present century to raise the standards of medical qualification have had some unforeseen results. One of them has been the uprising of numerous healing cults such as chiropractors and naturopaths with practically no standards at all. Another result has been that with the closing of numerous second-rate medical schools the remaining first-rate schools are not sufficient to meet the demand for medical education. It is widely believed that they are adequate to supply the medical needs of the nation and that there is already an oversupply of doctors. For this reason the medical schools are disinclined either to lower their high requirements in premedical education or to extend the size of their classes. The result has been that many would-be doctors have gone abroad for their medical education and returned with European diplomas claiming the right to practice in their native land. This displeases the State medical boards, who feel that there is a risk that the high standards of medical education achieved in recent times may not be maintained. At the annual meeting of the boards, held in Chicago on Feb. 14th, two resolutions were adopted. As a result all American students graduating from European medical schools after the present academic year must secure from a State medical board or other competent state authority a certificate to be endorsed by the Association of American Medical Colleges in proof of satisfactory premedical education. They must also pass an examination qualifying them to practise in the European country in which they must have studied for at least four academic years. American students in Great Britain should investigate these new conditions with

care unless they are now in their final year of medical school.

IDIOPATHIC PLEURISY AS A RISK IN LIFE ASSURANCE

Louis I. Dublin and Herbert H. Marks have recently made a study for the Metropolitan Life Insurance Company of the risk of insuring applicants who give a history of "idiopathic" pleurisy. They fully recognise that these cases represent true pleurisy of various but unrecognised origins and also some cases that were not true pleurisy at all. Nevertheless their statistical analysis of these cases is full of interest. They found that the excess mortality was for the most part concentrated in the years immediately following issuance of insurance and was more marked among the younger policy-holders. Underweight adds to the bad prognosis in the younger age-groups but is of less importance in those of more mature years. The excess mortality is, as might be expected, largely due to death from tuberculosis. They conclude that no applicant with a reliable history of wet or dry pleurisy should be granted insurance within two years of his illness, nor within three years if he be under 35 years of age. If he is below this age ten years must elapse before the applicant can be accepted as a normal risk. At ages over 35 a few cases may be granted standard insurance after five years have elapsed. The majority of cases reporting pleurisy of unspecified type (neither "wet" nor "dry") lasting only two or three days may be treated with generosity. Such a history is not regarded as of much importance.

DEATH OF MAYOR CERMAK

The death of the mayor of Chicago from an assassin's bullet aimed at President Roosevelt is deeply regretted. Among the reforms established in his administration is to be counted an ordinance passed on May 4th, 1932, creating a board of health of five members. For a number of years before this Chicago had no legally authorised health department. The ordinance of May 4th last reorganised the personnel of the department, eliminating waste and increasing efficiency.

PANEL AND CONTRACT PRACTICE

Medical Benefit and the Unemployed

IN the House of Commons last week Mr. Leckie asked the Minister of Health what he proposed to do about medical attention for the 60,000 or more insured persons who would, owing to recent legislation, pass out of benefit at the end of the present year; and the Minister answered that they would then be in the same position with regard to medical attention during sickness as all other persons who are now not within the scope of national health insurance. But is this really so? Most people leaving the ambit of the Insurance Act do so of their own accord. They may exceed the wage limit and so become able to pay for their treatment; or they may marry and again voluntarily pass out of insurance. But here are 60,000 or more people who, through no action of their own, are unable to pay insurance contributions. They belong to the insured group and not to any other; they are not passing out of benefit voluntarily—because of altered circumstances. They were obliged to become insured persons when first employed, and as such they had to choose to look after them a doctor who was willing to serve under the Act. Now when they go out of insurance benefit they will in theory be able to have the doctor of their choice, but it is perfectly clear that they will not in fact be able to do so, because they are not in a position to pay private fees. They will ordinarily receive attendance by those who still are, but are no longer called, parish doctors with the stigma attached to what used to be called poor-law relief. We have referred before to this unfortunate discontinuity of medical benefit, believing it to be a penny-wise policy on the part of the Ministry to treat this class differently from those who are better off. In the meanwhile, surely it is not correct to say they are in the same position as all others without the scope of the Act.

Records Then and Now

In the *St. Bartholomew's Hospital Journal* for March Dr. Philip Gosse has an interesting story to tell of contract work before the Insurance Act came into force. The club doctor was then appointed by the committee, and while it was definitely unwise to neglect any club members, the more especially if they were the friends of the secretary or of a member of the committee, yet the amount of attendance expected was not nearly so much as at the present day. There was less tendency to make much of illness than there is now, for all the members of the club knew each other; the secretary was soon warned, and through him the doctor, that John Smith was not fond of work and it was quite time he ceased to be drawing club funds. The snag of the position medically was that if trouble arose about a particular member, and the committee of management became hostile to their doctor, he was apt to lose the whole club and not, as under present insurance practice, only that member and his family. Nor was the keeping of records included in the capitation fee. While it may be true that the records required under the Act of 1911 have not materially varied since, Dr. Gosse makes good fun of the large folding book containing name, age, sex, address, visits, and medicine supplied, which had to be sent to the insurance committee for periodical inspection. His cheque for the first quarter arrived punctually, but at the end of the second quarter none came; after expostulating he was told that no cheque would be sent until his records for the previous six months had been received for examination. "So after dinner that night," he writes, "I got down to it, and filled in a vast number of sheets with the names of every panel patient I thought I could remember having treated, with suitable crosses or lines to indicate domiciliary calls or visits to my surgery. When I had made out what seemed to be enough of these to meet the requirements, I posted them off, and received my cheque by return." That such a feat of imagination was even then not unattended with risk may be seen from the sequel: "Not long afterwards a letter of thanks reached me from the local secretary to say that he had been instructed to write and inform me that at headquarters my meticulous and conscientious care of my insured patients was much appreciated, and that they hoped the example I had set would be followed by the other doctors in my area. It seemed that, according to the statistics, I had visited my patients at a rate of 300 per cent. higher than any of my colleagues." This official approval did not, however, increase his popularity, as a newcomer, with his fellow-practitioners, and afterwards we learn that he "fell into line and gradually brought down my numbers of visits to coincide with the rest." Things are strangely different to-day when the Ministry of Health have worked out areal averages for all kinds of practice, and H.M. Inspector of Taxes knows everything.

THE DOCTOR'S DAY

"Come, tell me how you live," I cried,
"And what it is you do!"

XX.—ON THE URBAN FRINGE

I AM usually awakened by my terrier who deposits my letters on the bed. This morning amongst the circulars of nostrum vendors and company promoters are several that will want filing later: a batch of medical record envelopes for new panel patients and some green cards requesting the return of others who have ceased insurance or moved out of the district; a report on a sputum; a request for a report on a panel patient who has been drawing sick pay for some months. This is opportune as I had thought of referring her to the regional medical officer myself; she does not seem to be unfit for *any* work, but always has a relapse or new symptoms when I suggest that she might "sign off." There is also a letter asking me to judge at a baby show and a notice of a meeting of the hospital managing committee.

Breakfast is interrupted two or three times by the telephone and soon after 9 A.M. I arrive at the surgery to find four or five people waiting, but the room will fill up just before 10 and I shall be there till nearly 11 as usual. An average morning surgery consists of six to eight private and the same number of panel patients. Most of our panel of a thousand is made up of clerks, typists, and domestic servants, with a few factory workers and shop assistants. Statistics kept over the last three years show that we see 66 per cent. of those on our list and this entails an average of 100 visits and 300 attendances per month.

CASES IN THE SURGERY

This morning's cases are fairly typical. The first is a little girl with a bead in her ear. If it had been in the nose I might have tried pepper, remembering a case where this practical measure promptly produced a sneeze and the invisible bead. The little girl is good and the hole in the bead lies propitiously for quick removal. Would half-a-crown have been exorbitant for a sniff of pepper?

Now come two regulars. The first a case of lupus, who has had a new nose grafted on from her arm. The nares of this had become so contracted that she was becoming a mouth-breather, but last year they were enlarged and she now wears a flesh-coloured prop in each. She should be fit for work soon, but the disfigurement is so great and the public so fearful of infection that I am afraid she will find it very difficult to get employment. I will suggest that she starts looking for work and continue to give her certificates in the meantime. The second is a patient with diabetes who attends a clinic in a London hospital, but comes to me for certificates. Legally I could give her a monthly one, but many societies will not pay out money weekly on a monthly certificate and as she cannot afford to wait a month I see her every Tuesday. Next comes a man for a dressing: quite a pleasant change at the surgery from the writing work. His neck shows a clean wound healing over where a carbuncle was excised five days ago at hospital. Another case is that of a woman at the menopause who fears she may be pregnant with her "seventh." She says it is cheap at 3*s*. 6*d*. to learn there is no pregnancy. Her record shows that she came for the same thing six months ago. Next Mrs. X wishes to engage me for her confinement. It is her first and she is two and a half months gone. I examine her to see that things are normal and take her measurements. As she has not engaged a nurse I give her a list of those I can recommend and send her away with instructions when to come again for further antenatal examination. Making a note in the "mid-book" I turn over the pages. There was a forceps case last week; otherwise I have not used forceps for six months and have attended 24 labours. Midwifery in private practice is much more likely to be normal than one expects after a short training in a lying-in hospital. As I look through the book it seems that the percentage of "normals" became higher and higher during the first five years of practice, so I suppose some of my early forceps were due to over-anxiety and the urge to rush in and do something rather than let nature have her way. My last patient is a young mother with a husband out of work and two children under three years—Will I tell her how to avoid further pregnancies? Information on birth-control is increasingly sought and it is high time the profession made up its mind on the subject and that something should be taught in our curriculum.

Before leaving the surgery I file the sputum report and deal with the panel correspondence. In the letter-box I find an envelope with something heavy inside. It is an old-fashioned door-key with a note requesting a visit later to Mrs. A.

COTTAGE HOSPITAL

From the surgery I go to hospital a mile away, where there is no resident medical officer, and the local practitioners attend their own patients and take duty in monthly rotation to be on call for accidents, anæsthetics, and emergencies. My patient who was operated on for fibroids is doing well; her neighbour is for operation this afternoon. I go over her heart and order an injection to be given beforehand. In the X ray department are the films and report of a barium meal and enema both confirming the presence of a suspected growth of the sigmoid colon. I must arrange for this patient to see one of the consulting surgeons or physicians who come down from London to the hospital on regular days to meet local practitioners and discuss with them their interesting or puzzling cases. The patient is saved the expense of train journey and hours of waiting at an out-patient department and appreciates the greater privacy and often less hurried examination given by the specialist. The practitioner has the advantage of discussion over the case and can moreover keep in contact with the patient right through an illness instead of losing sight of him during the most critical and interesting part of it, as so often happens when cases are sent to hospital out-patient departments.

In the children's ward my case of empyema is being dressed and I take the opportunity to go over her chest. A case of tonsillectomy has earache and remembering my own experience of three years ago, I ask sister to wrap warm wool round neck and ear.

It is now past eleven and I hurry home to hot chocolate and an appointment with a well-to-do woman who is suffering from the so-called "nervous breakdown." This is a delicate interview because I want her to consult a psychologist and yet not to feel that I have any doubt about the state of her mind.

A MORNING ROUND

After this comes the morning round, the first visit being to a nursing-home where a patient is recovering from an operation for hæmorrhoids. Here a telephone message reaches me to go at once to a case of asthma. I call for adrenaline as I pass home and the road takes me along a ridge between green fields to a house on the border of the district opposite the last street lamp; beyond this are only country roads unlit at night. The little boy I have to see suffers from asthma and eczema and at last we have tracked down the cause—sensitivity to horse dandruff. He cannot ride without getting eczema behind the knees or go for a drive in a dog-cart without an attack of asthma. He even got an attack after visiting the circus at Olympia. It had been half-term and he could not resist a canter round the grounds on his pony—result, an attack of asthma. He is given an injection of adrenaline and is soon relieved. Next I go to a house where I am always sure of a vociferous welcome and this from a patient who will

never pay his fee. He is a mongrel dog who had suffered for years from corneal ulcers. He has not had one now for four years and bounds upstairs to talk to me while I see the lodger, a maternity nurse with angina pectoris. She is happy now because last month her landlady had a baby daughter and she nurses the baby occasionally; but the dog is very jealous.

The morning round takes me seven miles out through hedge-lined lanes past young lambs in one field and the herd of a model dairy in another, to a combined poultry and fruit farm. The owner fears she has cancer as she has found a "lump." It turns out to be so but I do not tell her. As she refuses operation I can only try to persuade her to see a surgeon so that my responsibility will be shared. On the way back I call on Mrs. A. and am glad to be rid of the key which has been weighing down my pocket all the morning. I let myself in, taking the loaf of bread and bottle of milk which have been left on the doorstep to the kitchen. Mrs. A. is in bed with a sore-throat, temperature, and some painful spots on her legs. She says she has only stayed in bed to save my time and is very distressed to be told she must remain there and that her daughter will have to leave work and come home to look after her and the rest of the family. After four short visits I come to the last for the morning. This is to a wealthy woman who has had a slight chill, and being very fearful of her health wants to know if it will be safe for her to go to a theatre to-night. This visit takes longer than any other although it is the most trivial. The pros and cons are argued and I urge her to go, which I know she had intended from the first, or she would not have telephoned for me.

This is a specimen morning and might be varied by giving gas for teeth extraction; anæsthetics for minor operations; or very rarely by doing a post-mortem or giving evidence at court. Once my partner had to go to town to choose a baby from an adoption society for a childless patient.

THE AFTERNOON

The afternoon is spent in finishing the round which usually takes till 4 or 5 P.M. in the winter, but may be quite free in the summer. On one afternoon a week we do tonsil and adenoid operations for the education committee; another is taken up by operations; and a third for consultations. My partner holds two surgeries a week in a village to which a number of our better-to-do patients have moved out and where a far-sighted builder is putting up villas as fast as he can.

The evening surgery is usually larger than the morning one as patients in work are only free to come then. In winter there may be 24 or more cases which means at least 2½ to 3 hours work, but in summer I have usually finished in 1½ hours. A day such as this is calm but sometimes everything is upset, as by a midwifery case coming off in the middle of surgery hours, or an accident call from the police.

A CHANGING BACKGROUND

It is not claimed that such a day has any special features distinguishing it from that of general practice elsewhere, except perhaps in its adaptation to a changing background. Fourteen years on the urban fringe have brought changes to the doctor's work as well as to the life of the people and the look of the district. My partner and I run our surgery in a 300-year-old wooden house, which is now practically the only old building in a town of modern shops and flats, and which is quite dwarfed by the giant trams passing to the market-place. Gone is the ancient cedar-tree which had been a landmark for miles, and the Tudor house with royal associations and underground passages to rectory and church. Gone is a fine old red-brick mansion and its handsome wrought-iron gates, which have been removed to one of the universities; in its place is a housing estate with paved streets and rows of houses all hideously alike. Here and there in the district it is still possible to see red-tiled roofs overgrown with moss. Occasionally one finds beautiful oak panelling in a coal office, or a four-poster bed filling a small bedroom to capacity, but these discoveries are rare, like the text-book case in a doctor's day.

The population, too, has changed. The better-off people are yearly moving further away from the encroaching sea of small villas, with its concomitants the 'buses, trams, and coaches, and only those remain whose profession or business makes it a necessity to live near town—a few perhaps for the sake of schools for the children. Because of this the practitioner has to work harder for the same income. Two visits must be paid instead of one for the same fee, but it does not mean that the hours are twice as long, because houses are now much closer together and as the patient is often as busy as the doctor there is less ceremony and waste of time in small talk. Until the last few years we only had a few pensioners and club patients, but the number of the latter has been swelled considerably since the spread of unemployment. If this is to continue a system of insurance for dependants would benefit doctors as much as patients. Amongst other changes is the growth of the telephone system. It is now quite a rare event to hear the night bell, for call boxes are numerous and the public expert. Midwifery cases are fewer, partly owing to the fall in birth-rate, and partly to the inconvenience and publicity of "rooms" in a house shared with other families. For this reason many mothers prefer admission to a lying-in hospital.

Practice on the urban fringe affords varied opportunities for spending one's leisure. For the studious there are post-graduate courses or meetings at medical societies which can be regularly attended without putting extra work on one's partner. It is quite possible to act as clinical assistant at an out-patient department during the afternoon and to be back for the surgery in the evening. For the sportsman there is easy access to Twickenham, Lord's, or Wimbledon, with golf, hockey, tennis, and swimming at his own back door. Those who like town life may attend first nights or symphony concerts, while for the country lover there are other joys, not half an hour from home.

Altogether a good place to live and work in.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

Surg. Capt. L. M. Morris is placed on the retd. list.

The following appointments are notified: Surg. Comdr. F. C. Hunot to *Ganges*, for R.N. Sick Quarters, Shotley. Surg. Lt.-Comdrs. R. W. Higgins to *President*, for course; D. A. Newbery to *Pembroke*, for R.N.B., Chatham, and to *Renown*; and T. B. Lynagh to *Dolphin*. Surg. Lt. W. J. M. Sadler to *Pembroke*, for R. M. Infirmary, Deal.

ROYAL NAVAL VOLUNTEER RESERVE

Surg. Lt. G. H. Sellars to *Renown*.

ROYAL ARMY MEDICAL CORPS

Capt. E. H. Hall, from the secd. list, is restd. to the estab.

J. N. Concannon to be Lt. (on prob.).

TERRITORIAL ARMY

J. E. Morrison (late Offr. Cadet Edin. Univ. Contgt., Sen. Div., O.T.C.) to be Lt.

INDIAN MEDICAL SERVICE

Lt.-Col. (Bt. Col.) E. C. Hodgson to be Col.

Capt. M. Rodrigues relinquishes his temp. commn.

NAVAL MEDICAL COMPASSIONATE FUND

A meeting of the subscribers of the above fund will be held at 3 P.M. on April 19th next, at the Medical Department of the Navy, Admiralty, S.W., to elect six directors of the fund.

CORRESPONDENCE

FOOD AND HEALTH

To the Editor of THE LANCET

SIR,—I trust that all those concerned with the physical condition of the unemployed, and especially of their children, will read the special article on Food and Health in your last issue. A careful study of this valuable contribution is especially desirable because certain reassuring reports have appeared recently. Thus at the meeting of the London County Council on March 8th, a report of the examination of the children in the elementary schools of London during 1932 was submitted. In this it was shown that the percentage of children found with subnormal nutrition, which was 4·8 in 1930 and 1931, had only risen to 4·9 in 1932.

One cannot feel that conditions are satisfactory even when 4·9 per cent. of the children in the elementary schools of London are reported as suffering from want of the right sort of food, nor can one feel absolutely assured that the reports of the school medical officers record fully and completely the results of the present period of financial stringency on the health of the school-children. The effects of under-nourishment are by no means always easy to detect by physical examination. Moreover, they do not become evident at once. Furthermore, the amount of malnutrition that is recognised by an observer must obviously depend on the standard that he has in his mind during examination, and it is very easy for those engaged in this work to *confuse the average with the normal*. Should this confusion continue year by year, and about 5 per cent. of the children be recognised each year as below the *average*, a very considerable divergence from the *normal* may in fact exist after a period of years. That something of this sort is possible is suggested by two considerations: (1) a special report to the L.C.C., and (2) my own observations.

(1) On Jan. 17th last the medical officer of the L.C.C. reported on a special examination of 25 children of nine families attending a school in Poplar. These families were selected because social workers in the district felt uneasy about the children belonging to them. It was reported, however, after medical examination that the nutrition of only 7 of these 25 children was below the average, and in no case greatly so. The weights of 24 of these children were given in the report, and when I compared these with the average weights of children in the elementary schools of London at different ages I found that in 19 of the 24 the weights were below the average. The number of children examined is admittedly small, but it does seem significant that while only 28 per cent. showed signs of malnutrition as many as 76 per cent. were below the average weight of children of the same age in the elementary schools.

(2) During January and February, 1933, the medical examination of 53 children belonging to 21 families of the unemployed in one of the western districts of London was undertaken. The families were selected because we had reason to believe that members, other than those we examined, had shown signs of under-nourishment. There was, however, no selection of cases, and the record of every child examined is included in this report. I was assisted in this work especially by Dr. Margaret Ritchie, who examined with me about 90 per cent. of the children on whom we are reporting. Every child was examined by two of us before any opinion was given as to its physical condition.

In all cases the children were stripped and weighed, and their weights were later compared with the table of average weights of the school-children of London obtained from the education department of the L.C.C. In an explanatory note given with this table of weights, it is stated that the true weights of children under 7 are probably a little higher than those given in the Table. The children were examined in their homes and all were of school age with the exception of five that had not quite reached this age. In several of the families there were children below this age as well as a few above, but these were not examined.

We classified the defects observed under four headings: thin, rickety, flabby, pot-bellied. In not a few cases two defects were observed in the same child. In some cases we found it a very difficult task to determine whether a given child's condition was due to under-feeding or not. We appreciate that none of the above defects is necessarily an indication of under-nourishment; indeed, as will be seen in the Table which follows, with the exception of rickets, each of the defects described was observed in children that we did not regard as being underfed.

We have divided the children, for classification purposes, into those that in our opinion showed signs of under-nourishment and those that did not, and the general results of our observations are as follows:—

Under-nourished

No.	Sex.	Of average weight or over.	Below average weight.	Thin.	Rickety.	Flabby.	Pot-bellied.
15	Boys	2	13	11	4	2	4
18	Girls	7	11	9	11	3	3
33		9	24	20	15	5	7

Not Under-nourished

6	Boys	4	2	2	—	1	1
14	Girls	9	5	2	—	—	1
20		13	7	4	—	1	2

We also made inquiries of the parents as to how many of the children were having milk or dinners at school. We were informed that of the children showing signs of under-nourishment none was having dinners at school, but four were having milk which was given free. Of the children not showing signs of under-nourishment four were having school dinners given free, and three were receiving milk for which a charge was made. Several of the parents of the children showing signs of under-nourishment informed us that they had applied for school dinners, but these had been refused.

We were fortunately able to obtain and verify the income of each household and also the rent paid, and could therefore calculate the exact amount per head available to provide food, warmth, clothing, cleansing materials, and other necessities of life. This varied from 1*s.* 4*d.* to 4*s.* 6*d.*, and averaged 2*s.* 5½*d.* per week.

It might be objected that although 2*s.* 5½*d.* is a very small sum to provide all necessities, some of the persons concerned were very small children whose needs may have been much less than those of an adult or older child. Accordingly use was made of a table given by E. P. Cathcart and A. M. T. Murray in their report to the Medical Research Council (Spec. Rep. Ser. No. 151, 1931), and the "man

value " of each family was determined. The income after rent had been paid was divided by the figure thus obtained and the income per week per " man " calculated. This was found to vary from 2*s.* 6*d.* to 6*s.* 8*d.*, and average for the 21 families 4*s.* 5*d.* If this figure is compared with those given on p. 598 of your last issue, it will be seen that the sum is insufficient to provide a subsistence diet, *assuming that every penny is spent on food.*

The homes in which these children lived consisted in every case of tenements of one, two, and three rooms. There were three single-roomed homes and it was stated that 17*s.* a week was paid as rent for one of these. The rooms were for the most part in a very fair state of repair, nor was there any shortage of furniture; but bed-clothes were often sadly deficient. In at least three-quarters of the cases both homes and children were reasonably clean. Nearly all the children were well shod, and most were fairly tidy externally; but when their outer garments were removed the underclothing was in most cases much torn and patched, and not infrequently very small in quantity.

Some of the worst cases of under-nourishment came from homes which were scrupulously clean and tidy, and the children themselves were well turned out. On the other hand, some of the raggedest children appeared well fed. We came to the conclusion that where the whole of the income of the family was spent on nothing else but food, nutrition was, at any rate in some cases, maintained. When, however, any considerable part of it was used in replacing clothes, or for the purchase of cleansing materials, &c., sufficient did not remain to provide the necessary nourishment.—I am, Sir, yours faithfully,

SOMERVILLE HASTINGS.

Devonshire-street, W., March 20th, 1933.

THE ACRIFLAVINE TREATMENT OF BURNS

To the Editor of THE LANCET

SIR,—Since E. C. Davidson introduced the tannic-acid treatment of burns in 1925 his method of applying it has been considerably modified by surgeons in this country who have had experience of this line of treatment in hospitals, industrial clinics, and in general practice. While this experience has resulted in much support for the various methods evolved, it has also given rise to a timely reconsideration of the whole question of burn treatment and to some criticism of the theory, practicability, and end-results of Dr. Davidson's method. Originally he used, and advocated, the addition of corrosive sublimate to the tannic-acid solution and expressly enjoined that there should be no preliminary cleansing of the burned area. Since then there have been many advocates of thorough surgical cleansing of the burn, even to the extent of using a nailbrush, under general anæsthesia, and no germicide is now added to the aqueous tannic-acid solution. J. H. Hunt and P. G. Scott contributed to your columns an interesting account of the use of tannic acid for burns in the out-patient department of St. Bartholomew's Hospital,[1] and further expounded their method at a meeting of the Council of Industrial Medicine when its applicability to industrial and first-aid work was considered.

Being in medical charge of a large industrial clinic, and favourably placed to try out new methods of treatment, I began experiments with tannic acid in the treatment of the various kinds of burns met with in the factory in 1929. I tried combining with it various germicides. Iodine was found to oxidise the tannic acid in watery solution. An aqueous solution of tannic acid (2·5 per cent.) containing 0·5 per cent. sodium salicylate, applied at a temperature of 40° C., was found to be stable but costly, and a 2 per cent. solution of thymol added to the tannic acid was found better and much cheaper. Lately most advocates of the treatment have discarded all additional antiseptics and rely upon what they term " fixation " of the toxins in the wound reinforcing the tannic-acid scab with collodion; but they all realise the danger of doing this without thorough preliminary surgical cleaning of the burned area.

My own opinion is that the tannic-acid treatment may be a distinct advance for serious burns necessitating in-patient care in hospitals or nursing-homes, but I doubt whether it is suitable for hospital out-patients, and I am sure it is not applicable to the work of industrial clinics, or as a first-aid dressing. Whether applied by spray or brush, it necessitates artificial drying; it takes too much time both in the first instance and at redressings; it is not free from pain; in the absence of a reliable germicide in the dressing thorough preliminary cleansing is necessary to prevent secondary sepsis, and this involves prolonged exposure with increase of initial shock; it cannot be applied near the eyes and therefore is difficult to use in face burns, and finally its solvent is water which by its negative osmotic pressure is known to interfere with normal tissue tension. In fact the whole technique of the tannic-acid treatment is troublesome, and I am not convinced that it offers any advantage over other lines of treatment for burns of the first, second, and third degrees. Mr. Charles Donald of the London Hospital has published[2] views which largely confirm this, but neither in his paper, nor in the general literature on burns have I been able to find reference to their treatment by acriflavine emulsion.

At the suggestion of Dr. Leonard P. Lockhart I have been using acriflavine emulsion for the past year or so to the exclusion of all other forms of treatment. This dye-stuff was introduced by Ehrlich as an effective trypanocide and is 3 : 6-diamino-10-methylacridinium chloride hydrochloride. Its general antiseptic properties were discovered by research workers in the Bland-Sutton Institute of the Middlesex Hospital in 1914, and although it has been on the market some years, and is in use in two large hospitals, it is not at all widely known to the profession. Acriflavine emulsion is a 1 in 1000 emulsion of this compound in pure sterile medicinal paraffin. Though it resembles picric acid in colour it is entirely different in chemical composition and is non-toxic. The emulsion is applied freely on lint to the burned surface, after removal of jam or other causative agent, but without any general surgical toilet of the part. The dressings do not usually adhere, but if they do can be moistened with the emulsion before removal. It is painless and quite harmless to the conjunctiva or any mucous surface. Under its influence burns remain clean, free of all septic infection, and supple, without the usual tendency to scarring and contraction. There is no hard scab, as with tannic acid, and none of the disadvantages of ointments which cake and clog the wound. Any blisters present are freely opened and dried with a gauze swab, the dead epithelium dissolving and disappearing in the emulsion instead of having to be cut away, as is the case with most other dressings. Another great advantage is that a bottle of the emulsion can safely be given to the patient to apply at home, as the redressing is simple and painless.

Acriflavine emulsion is now used exclusively for

[1] THE LANCET, 1932, ii., 774.

[2] Ibid., 1930, ii., 949.

burns in my clinic and in the first-aid boxes throughout various branches, factories, and workshops of my firm. Even in extensive burns there has so far been no sign of any toxic effect from the free use of this compound and, personally, I consider it by far the most satisfactory burn dressing. It has also many other uses, being excellent for sinus disinfection, unhealthy ulcers, and for many pyogenic dermatoses. My experience with it is confined to the brand manufactured and marketed by Boots Pure Drug Co., which is uniform in quality and economical both in price and use. For these reasons I advocate most strongly the use of acriflavine emulsion as an industrial treatment for burns and also as the most suitable first-aid treatment in private houses. If a bottle of it were kept in every kitchen we should hear far less of the tragic septic after-effects of domestic accidents.

I am, Sir, yours faithfully,

N. HOWARD MUMMERY.

The Clinic, J. Lyons and Co., Cadby Hall,
March 20th, 1933.

THE EMPLOYMENT OF NEMBUTAL

To the Editor of THE LANCET

SIR,—The recent coroner's inquest reported in your columns has served to show a very unsatisfactory state of affairs with regard to the use of the new barbiturate drug, nembutal. Whilst Sir Wm. Willcox unhesitatingly labels it dangerous, and would almost say that it is unjustifiable to use it at all, others appear to have used it largely, with good results and without mishap. It appears in fact doubtful if any death can be directly laid at its doors.

Sir Wm. Willcox quoted four cases with three of which I was concerned, but the cross-examination and coroner's summing up clearly indicate that from the experience of these there is no clear contra-indication to its use. The cases have not been published, partly because they were not considered as nembutal deaths, and partly because of the reluctance of the hospital authorities for publicity; but as a result of the coroner's remarks they will shortly be offered to THE LANCET for publication. The purpose of this letter is to seek from those most qualified to express an opinion an indication as to whether it is considered right that nembutal should be used at all, and, if so, under what circumstances it may be safely used; and, moreover, to define very clearly the contra-indications.

In his evidence Sir Wm. Willcox stated that after nembutal administration a patient might partially recover and then relapse; that nembutal differed in this respect from the other barbituric acid drugs in which coma lasted until death; that nembutal might produce death without producing any signs (on the tissues); the only signs of nembutal poisoning were the absence of signs of natural disease plus the presence of nembutal in the liver and kidneys. Asked upon what evidence he based these statements Sir Wm. Willcox replied that he knew of four cases, but agreed that they were complicated and not pure cases, and that one must not attach too much importance to them. On the other hand, Dr. Ryle said that it was outside medical experience for a patient to succumb to a hypnotic remedy from the effects of which she had so far recovered; and again Dr. Douthwaite said that the fact that the patient was wide awake and active nine hours after the nembutal had been given negatived the suggestion of death from that drug. Others gave evidence of a large experience of the use of nembutal without mishap. I have personally given it more than 750 times intravenously, over a period of two years, and have never had cause for alarm which could be ascribed to the nembutal per se. I have come to look upon it as a particularly safe drug when compared with other hypnotics, and as one with a fairly wide margin of safety. My present feeling, which I know is shared by many others, is that whilst I regard nembutal as a most valuable drug the benefit of which I wish to give to my patients, I have become afraid to use it because of the consequences which may follow should any untoward development occur; for whilst the Home Office authorities adopt their present attitude I may find myself made responsible for a mishap which was entirely due to another cause.

I am, Sir, yours faithfully,

STANLEY ROWBOTHAM.

Wimpole-street, March 21st, 1933.

THE BLOOD SEDIMENTATION-RATE

To the Editor of THE LANCET

SIR,—The conclusions arrived at by Dr. R. R. Trail in his interesting paper on the Sedimentation-rate and Ultimate Prognosis in Tuberculosis in your issue of March 11th (p. 522) are confirmed by the after-histories of some three hundred of my patients, whose sedimentation-rates were estimated during the three years 1929–1931. Dr. Trail's investigation in particular establishes the fact that patients who leave the sanatorium with normal, or only very slightly increased, sedimentation-rates, have as a rule a better outlook, although the sputum may be T.B.-positive, than patients who leave with a T.B.-negative sputum, but with a sedimentation-rate definitely increased above normal. This is in conformity with the observations of Prof. S. Lyle Cummins and Dr. S. B. H. Walker (*Tubercle*, June, 1931), who, after a detailed investigation of 100 cases in 1929 and their subsequent review 12 months later, came to the conclusion that "cases found to be favourable by the blood assessment really are favourable," whereas on clinical grounds alone there is a fair possibility of assessing favourably certain cases which are likely to do badly.

It is however not only in the prognosis of pulmonary tuberculosis that I have found regular and repeated estimations of the blood sedimentation-rate to be of special value, but also in the management of such cases, both in the sanatorium and at home. It is especially in this regard that I would appeal for its more general use. If the amount of rest and the degree of the capacity for physical activity are assessed solely on what Dr. Trail refers to as "the usual criteria of physical signs, pulse, temperature, and 'exercise tests,'" a not inconsiderable number of patients are doomed to the disappointment of relapse. Radiographic appearances, particularly in so far as they suggest the state of activity of the lesions, may be usefully added to the above criteria in the assessment of the patient's fitness. In this assessment however, necessitating as it does the important prescription of rest and exercise, I have found the sedimentation-rate, which is an objective index of the state of activity of the disease, to be of great value. It is, in my opinion, particularly helpful when the temperature and pulse-rates are within normal limits, and the degree of activity of the lesions is not definitely manifest from physical examination and the radiographic appearances.

The more frequent use of sedimentation estimations in general and consulting practice would appear to be justified also as a means of distinguishing in certain cases between the so-called functional and organic. Recently there have come under my care two patients in whom lassitude, slight loss of weight, and disturbance

of digestive functions have been the only definite symptoms. Each had been examined clinically by several doctors. Gastro-intestinal function had been investigated chemically and radiologically, and the symptoms had been attributed to "functional" causes. After many months had elapsed, and different doctors had been consulted, the underlying basis of the symptoms—viz., pulmonary tuberculosis—was revealed by radiographic examination of the chest. On admission the blood sedimentation-rate was in each case appreciably increased above normal, and examination of the radiograms of the chest showed that the pulmonary disease was at least of several months' duration. It would appear probable that, had the first clinical examination been completed by an estimation of the sedimentation-rate, a toxæmic cause for the symptoms would have been definitely established, and radiographic examination of the chest recommended many months before it was actually done.

In conclusion, owing to the fact that a number of patients who have had serofibrinous pleurisy develop active pulmonary tuberculosis within a few years, attention should be paid to the sedimentation-rate during convalescence from the pleural effusion; this in particular to determine the length of convalescence required, and to regulate the patient's activities. Further, such patients should be warned to return for examination should they notice any departure from normal health, and sedimentation estimations will be found of value in these periodic examinations. My experience suggests that in the majority of cases where pulmonary tuberculosis develops after pleural effusion, the sedimentation-rate has not settled to normal, and that, in spite of this indication of the smouldering of the disease, the patient's activities have been insufficiently limited.

I am, Sir, yours faithfully,

HILARY ROCHE.

The British Sanatorium, Montana, March 16th, 1933.

THE COCKTAIL IN HYPOGLYCÆMIA

To the Editor of THE LANCET

SIR,—In the leading article on Spontaneous Hypoglycæmia in THE LANCET of March 11th (p. 533) it is suggested that the wide popularity of the cocktail before a meal is in part due to the relief of hypoglycæmia which it brings. This may give rise to the impression that it is the alcohol in the cocktail that "does the trick." Recent work by Edkins, Murray, and Hunt points to the fact that alcohol tends to produce a hypo- rather than a hyper-glycæmic condition. The two former workers have shown (*Jour. of Physiol.*, 1931 and 1932) that in normal human subjects alcohol with glucose decreases the degree and duration of hyperglycæmia, and that small doses of alcohol given to normal human beings lower the blood-sugar slightly. T. C. Hunt (THE LANCET, 1930, i., 121), dealing with alcohol given to diabetics, refers to experiments by others showing that alcohol tends to reduce rather than increase blood-sugar, and speaks of the action of alcohol as "such insulin-like action." There may be differences of opinion with regard to the value of a cocktail, but it should be clearly understood that whilst the glucose in a drink might possibly help, the alcohol (and in a cocktail it is present in a high percentage) will more likely increase than decrease the hypoglycæmia.

I am, Sir, yours faithfully,

COURTENAY C. WEEKS.

Beckenham, March 15th, 1933.

TREATMENT OF ENLARGED TONSILS IN CHILDREN

To the Editor of THE LANCET

SIR,—I have read the article by Mr. T. B. Layton in your issue of March 11th with some surprise. The conclusion Mr. Layton arrives at is that the great indication for operation is the history of recurring follicular tonsillitis. This however, he states, rarely occurs in small children. Therefore removal of tonsils in children up to 5, 6, 7, 8 years of age should not be done unless it can possibly be helped.

He says, however, that instead of developing recurring tonsillitis these children are subject to "droplet infection giving them an inflammation of the upper respiratory tract," and that later on tonsils which are primarily filters for holding organisms and factories for the production of immune bodies instead of resisting invasion become themselves the cause of trouble and are a source of sepsis, but that in spite of this they should not be removed unless the rare complication of recurring tonsillitis should occur. This amounts to saying that the child is to keep up to 12 years of age a septic focus, giving rise to a chronic infection both local and general, because the lymphoid tissue in the pharynx (of which the tonsil is only a part) is necessary to the child's development. As a school medical officer I see hundreds of children every year, and in conjunction with many of my colleagues in other areas I am firmly convinced that the conclusions above arrived at are not supported, judging by the beneficial results one sees from the effect of early operation on children with enlarged septic tonsils. As school medical officers who advocate operation appear to have come under some criticism in the Report of the Chief Medical Officer of the Board of Education for 1931 I have written a fairly full account of this subject for my committee in my report for 1932.

The conclusions I put forward are: (1) lymphoid tissue is primarily protective; (2) this tissue when exercising its protective function becomes enlarged; (3) if the infection is overcome the swollen tissue will again subside; (4) if the resistance of the tissue and the individual is low, enlargement will persist; (5) the persistence of enlargement means the presence of a septic focus; (6) chronically enlarged tonsils must have lost any beneficial action they may have ever possessed and must be regarded as a source of danger immediate and remote; (7) such septic foci ought to be removed. This is no attack on a normal structure of the body but upon a diseased organ.

The particular point I wish to emphasise is that it is high time the medical profession threshed this matter out and came to some agreement, as otherwise our differences are likely to be a source of derision among the lay public. To operate or not, that is the question; and one answer only can be correct.

I am, Sir, yours faithfully,

W. W. JEUDWINE, M.D.,

March 20th, 1933. School Medical Officer, Newport, I.W.

OSCILLOMETRY AND THE "MEAN" PRESSURE

To the Editor of THE LANCET

SIR,—I was greatly interested in your annotation on this subject. I feel sure that the estimation of this mean pressure is of much greater value than has hitherto been realised. French workers have laid stress on this for some time now, and in this country Dr. J. F. Halls Dally has done the same. With the Pachon type of instrument I have never been particularly happy—possibly my own faulty technique.

My chief reason for writing to you is that a short time ago I came across an instrument that to me was unique, one that checks its own readings with an ordinary sphygmomanometer and anyone could learn to use successfully in a few minutes.

Briefly, it is as follows. There is the usual armlet to which is attached an ordinary manometer—not a mercurial one, unfortunately. A bracelet with an efficient tambour for the brachial artery is provided. A stethoscope is also supplied, and this one couples up with the tambour by means of a Y-piece. Coupled up with the manometer by a rubber tube is an oscillometer; on this there is, of course, an interrupter. According to the oscillations of the needle, one can read off *on the manometer* the three pressures—systolic, mean, and diastolic. The figures on the oscillometer mean nothing apart from allowing one to measure the size of the deflections.

The chief value of the instrument is, in my opinion, the ease with which one can estimate the mean pressure; the systolic and diastolic can be estimated by any manometer. It is made at the Laboratoire du Detensyl at Nice, the British agents being Continental Laboratories, Ltd. It is very well got up, and is carried in a light leather case, and the price is low—£3. I am, Sir, yours faithfully,

A. GRAHAM-STEWART.

Ulster-place, N.W., March 18th, 1933.

THE INTIMATE NATURE OF NERVOUS ACTIVITY

To the Editor of THE LANCET

SIR,—Your leading article (March 18th, p. 589), written, no doubt, with high authority, contains some statements which are difficult for the non-expert reader to understand. It is said that the passage of a nervous impulse "is followed at once by a refractory period . . . Hence summation of impulses is impossible—for at the moment during which one impulse is occupying the wire another cannot be added to it." Surely it is not suggested that summation is, or would be, produced by the *simultaneous* passage of a number of impulses along a nerve fibre. It was shown by Keith Lucas that, if a region of decrement—that is, a region in which conduction is difficult—is introduced into the course of a nerve-fibre, nervous impulses undergo a progressive diminution in intensity in their passage through that region, until eventually they may be extinguished. But, if a nervous impulse manages to survive its passage through the region of decrement, it emerges on the other side in full intensity regardless of the strength of the stimulus which originated it, or of the amount of diminution which it has undergone. Further, the passage of a nervous impulse is followed by a period during which conductivity is diminished (the "refractory period"), and this, in turn, is followed by a period during which conductivity is increased (the "supernormal phase.") If successive nervous impulses are timed so that each one after the first falls within the refractory period of the one which preceded it, a complete block may be established so that no impulses are able to pass through the region of decrement. But, if the impulses are timed so that each one arrives during the period of increased conductivity which follows the preceding one, it becomes eventually possible for impulses to pass through the region of decrement, and, as already noted, they emerge on the other side in full intensity. This, surely, is what is meant by the "summation" of nervous impulses.

There is a strong presumption that the same processes occur in the case of the nerve-cell. It is true that in Keith Lucas's experiments the region of decrement in nerve-fibre was produced by artificial means. It is probable that the nerve-cell is more susceptible than the nerve-fibre to natural diminution or increase of conductivity, possible, as you suggest, by the action of hormones or "humoral stimuli." And it is more than probable that the natural regions of variable conductivity in the nervous system are situated mainly at the synapses and junctional tissues. But it is not at all evident (to the uninitiated) that "the nature of the processes in those two parts of neural tissue (the nerve-fibre and the nerve-cell) is different." One would also like to know whether there is any evidence that *an* impulse arriving at *the same* ganglion cell may either arrest activity or stimulate it; and, lastly, why inhibition is not "comparable with the refractory phase of nerve transmission"?

These remarks are not made in any spirit of captious criticism. Keith Lucas, one of the most brilliant scientists that I have ever known, had a shrewd conviction that the processes of conduction in the central and in the peripheral nervous system would be found to be fundamentally of the same nature. If this be true, there is good reason to hope that much may yet be learnt from the comparatively simple study of the processes in peripheral nerve. "If the central nervous system involves processes which are entirely unknown in peripheral nerve, then the analysis of peripheral conduction loses a great deal of its interest and the problem of central conduction becomes infinitely more formidable" (Keith Lucas).

It will be noted that Prof. Hill's work (quoted in your article) is concerned entirely with processes occurring in peripheral nerve.

I am, Sir, yours faithfully,

A. S. BLUNDELL BANKART.

London, W., March 21st, 1933.

PUBLIC HEALTH SERVICES

Ministry of Health on Local Expenditure

THE comments of the Minister of Health on certain sections of the report of the Committee on Local Expenditure[1] have been issued in Circular 1311,[2] addressed to local authorities. The general soundness of the principles on which the committee based their concrete proposals, and indeed of many of the proposals, is not questioned, but the Minister points out certain considerations which must not be ignored. The most important of these is that the public health service cannot be static; some measure of development and new expenditure is inevitable as fresh needs become manifest. Outstanding instances, he says, include maternity and child welfare, in respect of which few authorities have yet established a complete service; and in some remaining areas, where this is desirable on public health grounds and also feasible, the appropriation of poor-law infirmaries. In all such matters of development the need for economy must be weighed against the urgency of the suggested public health development. Among the recommendations of the committee to which local authorities are asked to give special attention are those advocating better coöperation in regard to infectious diseases hospitals, the more careful selection of patients sent to sanatoriums, the shortening of the routine period of isolation for uncomplicated cases of scarlet

[1] See THE LANCET, 1932, ii., 1238.
[2] H.M. Stationery Office. 2*s.* 6*d.*

fever, the treatment of mild cases of scarlet fever at home, the practice of terminal disinfection, and the reservation of institutional treatment to those who cannot be treated otherwise.

Birth- and Death-rates in Northern Ireland

Although, according to the report of its Registrar-General,[3] the birth-rate of Northern Ireland in 1931 was, with one exception, the lowest recorded since 1901, it still enjoys the distinction of being the highest in the British Isles. At 20·5 per 1000 of the estimated population it is some 30 per cent. higher than the present rate of England and Wales (the comparison is of crude rates, but the proportion of the population in the two countries that is made up of women at the child-bearing ages does not differ appreciably, and measurement of the rates as births per 1000 women aged 15 to 45 years would give approximately the same result). In 1901–05 the birth-rate in England and Wales was 28·2 per 1000 living at all ages, and save for the exceptional post-war period it has practically never ceased to fall; by 1926–30 it had fallen as low as 16·7 per 1000, or 59 per cent. of its value at the beginning of the century. In Northern Ireland, on the other hand, reading from one of the diagrams included in this report, the rate in 1901–05 was about 25 per 1000—i.e., *below* the English rate; by 1926–30 it had declined to only 21 per 1000 and was therefore still over 80 per cent. of its value at the beginning of the century. For the years 1928–31 it has remained practically stationary at 20 to 21 per 1000. One possible explanation of this relatively high rate is the restrictive influences of Catholic principles, but in opposition to this it will be remembered that W. T. Russell found, in his careful study of Irish fertility,[4] that the fertility in the counties of Antrim and Down, including the borough of Belfast, had declined only 8 per cent. during the 40 years 1871–1911 as compared with 30 per cent. in rural Wales; and in these two counties the Catholic population, he concluded, comprised at the utmost only 25 per cent. of the total. From 1928 to 1931 this report of the Registrar-General shows that the highest birth-rates of Northern Ireland are to be found in the two county boroughs, Belfast and Londonderry (as the calculation is based upon the populations at the census of 1926 these rates would be overstated if there has been any expansion of these areas in the last five years).

Turning from the birth-rates to the death-rates it will be noticed that the latter for Northern Ireland compare in one respect very curiously with those of England and Wales. Comparison of the standardised rates for all causes shows that the males of the two countries do not differ very appreciably in their mortality; in 1931 the Northern Ireland rate was 11·7 per 1000 and the England and Wales rate was 11·4; for the five years 1927–31 the rate in Northern Ireland was 12·0 per 1000, in England and Wales 11·6. The males suffer a slightly higher rate of mortality in Northern Ireland, but the difference in the last few years is quite slight. Females in Northern Ireland, on the other hand, show an appreciably higher rate than their cousins over the water. In 1931 the standardised rate for females was 11·2 per 1000 in Northern Ireland, 9·2 in England and Wales; in 1927–31 it was 11·4 in the former compared with 9·3 in the latter. Whereas the ratio of the female to the male death-rate is only about 81 per cent. in England and Wales, it is about 95 per cent. in Northern Ireland. In fact, calculation of death-rates at ages (on the basis of population at the 1926 census) from the absolute numbers of deaths set out in this report shows that in 1931 the female mortality was appreciably higher than the male mortality at ages 15 to 45, and at most other ages differed from the male mortality by considerably less than is found in England and Wales. According to the rather limited data available in this report—i.e., for the one year 1931—females compared with males suffered unduly high death-rates in Northern Ireland from influenza, tuberculosis of the respiratory system, bronchitis, cerebral hæmorrhage, embolism and thrombosis, and chronic endocarditis and valvular disease. This report only provides the raw materials and offers no clue to the origin of this very noticeable feature of the mortality. Perhaps it should be sought, at least in part, in the proportion of women occupied in the linen mills.

The tuberculosis death-rate, as a whole, has declined quite as steadily in Northern Ireland as in England and Wales, but its level is still appreciably above that of the latter country among young adults. Between the ages of 15 and 25 tuberculous diseases caused, in 1931, more than 500 deaths in every 1000. The crude cancer death-rate, on the other hand, is appreciably below that of England and Wales, but as 8 per cent. of all deaths in Northern Ireland were in 1931 uncertified, and in allocation of cause of death 11 per cent. of all deaths were ascribed to senility, there can be little doubt but that the true rate is understated. During this century there has been a slight increase in the population (in contradistinction to the continual fall in the nineteenth century), but 1931 is the first year in the history of Northern Ireland as a separate administrative unit in which there has been recorded a net migration movement inwards.

[3] Government of Northern Ireland. The Registrar-General's Annual Report of Births, Deaths, and Marriages for 1931.
[4] Metron, 1928, i., 101.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED MARCH 11TH, 1933

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 15 (last week 9); scarlet fever, 1846; diphtheria, 839; enteric fever, 25; acute pneumonia (primary or influenzal), 1299 (last three weeks 2228, 1436, 1362); puerperal fever, 43; puerperal pyrexia, 101; cerebro-spinal fever, 74; acute poliomyelitis, 3; encephalitis lethargica, 13; continued fever, 2 (Northwich R.D., Chester, and St. Thomas R.D., Devon); dysentery, 21; ophthalmia neonatorum, 98. No case of cholera, plague, or typhus fever was notified during the week.

The notifications of acute pneumonia, primary or influenzal, were still below the expected number by 34 per cent. in England and Wales and 20 per cent. in the County of London.

The number of cases in the Infectious Hospitals of the London County Council on March 14th–15th was as follows: Small-pox, 52 under treatment, 3 under observation (last week 52 and 2 respectively); scarlet fever, 1665; diphtheria, 1581; enteric fever, 8; measles, 302; whooping-cough, 711; puerperal fever, 23 (plus 10 babies); encephalitis lethargica, 231; poliomyelitis, 2; "other diseases," 403. At St. Margaret's Hospital there were 18 babies (plus 12 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox or enteric fever, 35 (0) from measles, 6 (2) from scarlet fever, 44 (14) from whooping-cough, 29 (5) from diphtheria, 54 (10) from diarrhœa and enteritis under 2 years, and 157 (21) from influenza. The figures in parentheses are those for London itself.

No great town reported more than 8 deaths from influenza. The column of typhoid and paratyphoid fevers is blank. Eight deaths from measles occurred at Liverpool, 3 each at Birmingham, Cardiff, and Newport. Whooping-cough accounted for 4 deaths each at West Ham and St. Helens.

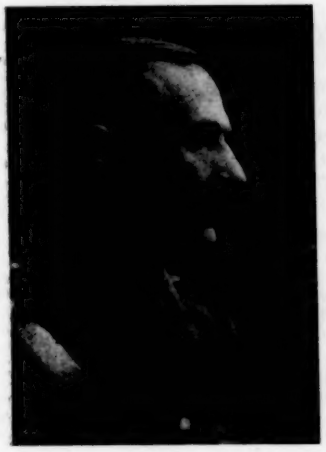
The number of stillbirths notified during the week was 286 (corresponding to a rate of 41 per 1000 total births), including 49 in London.

OBITUARY

ARTHUR COOKE, M.B., B.Ch. Oxf., F.R.C.S. Eng.

WE announced last week the death of Mr. Arthur Cooke, surgeon to and surgeon in charge of the ophthalmological department at Addenbrooke's Hospital, Cambridge. This occurred on Monday, March 13th, at his house, Grove Lodge, Cambridge, after a brief illness, the sudden termination to which was unexpected.

Arthur Cooke was the son of Henry James Cooke, of Bradford, and was in his 65th year. He was educated at Giggleswick and New College, Oxford, and after taking honours in the Natural Science Schools proceeded for his medical training to the London Hospital. He graduated M.B., B.Ch. Oxf. in 1895 and almost immediately took up practice in Cambridge as surgical partner to a well-known firm. During the war this partnership was dissolved and afterwards Mr. Cooke practised as a consultant. In 1898 he was made an M.A. Camb. and in the same year obtained the diploma of F.R.C.S. Eng.



MR. COOKE

Prior to the war Cooke was a major in the Territorials, and at the outbreak of hostilities he served on the staff of the First Eastern General Hospital. He soon went to France where he was attached as a surgeon to various military hospitals, and at the close of hostilities was a Lieut.-Colonel in the R.A.M.C. At the end of the war he became president of a joint organisation of the Y.M.C.A. and the C.E.Y.M.S., and was responsible at Cambridge for the formation of a panel of blood donors, composed of members of the Y.M.C.A., which was attached to Addenbrooke's and which still functions.

To Addenbrooke's Cooke was a devoted servant. He became assistant surgeon to the institution nearly 30 years ago, and having already specialised in ophthalmic work he was placed in charge of the ophthalmic department of the hospital on the retirement of the late George Wherry. On becoming full surgeon to the hospital he was appointed teacher in surgery at the University, and at various times acted as an examiner for the medical degree. He was also one of the most active movers for the recent extension of the hospital. As a member of the appeal and propaganda committees and an active worker on various subcommittees, he spoke assiduously at many centres in the county in support of the movement, and last year he saw the realisation of one of his principal objects—namely, the completion of the new eye wards.

A colleague writes of Arthur Cooke and his hospital work in words which may be quoted in full. "Above all that he achieved," he says, "Arthur Cooke had qualities which bound him to all with whom he came in contact. It would be difficult to find a more loyal, energetic, and enthusiastic colleague on a hospital staff. As senior surgeon to the hospital and surgeon in charge of the eye department he did the work of two men, and it was only his boundless keenness that made this possible. He never spared himself and certainly never seemed to want to. At the end of a long out-patient morning, the way in which he would apply himself with zest to the examination and discussion of a fresh case was characteristic of all his work. He rarely appeared tired and always seemed to enjoy his work so that to consult him was a pleasure. His surgical technique reached a very high standard and this was maintained up to the time of his death. Perhaps he excelled most in gastric surgery, and some of his colleagues will always remember the faultless technique displayed at a particular gastrectomy which he performed about three months ago. In spite of an enormous amount of routine work he found time to read widely and keep up to date, and was continually improving both his own methods and the work of the hospital by meticulous attention to detail. In this respect he remained always young and a stimulus to all who worked with him. In addition to his hospital work he had a very large practice as a consulting surgeon. On the administrative side his personality and charm smoothed over many difficulties. He always seemed to know exactly how far the opposition would allow him to go. If he were held up temporarily his tact and friendliness usually took him a good deal further ultimately. This power was one of the biggest factors which brought to completion the extensive scheme for enlarging Addenbrooke's, and it is probable that the raising of the £85,000 obtained for this purpose would never have been attempted but for his leadership and charity. In the face of a great loss it is pleasant to think that he saw the hospital of his dreams, in buildings and equipment at any rate, standing almost complete before he died."

The activities referred to in the quotation above should be enumerated. Cooke was a member and ex-president of the Cambridge Medical Society and an active supporter of the work of the B.M.A., at one of whose annual meetings he had been president of the surgical section. He was chairman of the house committee of the Evelyn nursing-home, and consulting surgeon to the Papworth Village Settlement, the Rous Memorial Hospital at Newmarket, and the Royston Cottage Hospital. He was also a distributor under Crane's Charity, a fund which assists undergraduates of the University in the payment of medical and nursing fees, and had interested himself in the life insurance of the students. He was the author of a sound elementary text-book on surgery, and of various contributions to medical journals.

In private life Arthur Cooke was a man of varied activities. At Oxford he obtained his blue for cross-country running, and both there and at the London Hospital was a prominent footballer. He was a fine skater, president of the University skating club and medallist of the National Skating Association. He had been captain of more than one golf club, he sailed his boats regularly on a Norfolk Broad, and was among the earliest drivers of a motor-car in the neighbourhood.

Mr. Arthur Cooke married in 1891 Lucy, only daughter of the late Mr. John Collyer of Edgbaston, and leaves a widow, a daughter, and two sons; his eldest son was a victim in the *Vanguard* disaster at

Scapa Flow. The funeral service at Great St. Mary's Church, Cambridge, was attended by a great concourse of his professional and University colleagues, the representatives of many colleges, and friends.

MONTAGU LOMAX, M.R.C.S. Eng., L.R.C.P. Edin.

THE death is announced at Windlesham House, Shoreham-on-Sea, on Friday last, March 17th, of Dr. Montagu Lomax, who was associated prominently some years ago with the National Society for Lunacy Law Reform. He received his medical education at Edinburgh and St. Bartholomew's Hospital, and obtained his qualification in 1883. He was in practice for a time in New Zealand and was honorary medical officer to a hospital at Canterbury. Later he was assistant medical officer at Prestwich Asylum, but was not a regular member of the asylum medical service. He was however in temporary employment at two asylums during the war, and his life in these institutions impelled him to write a book entitled "Experiences of an Asylum Doctor." This sensational book played a part in the institution of a departmental committee appointed to inquire into the administration of the mental hospitals, but Dr. Lomax declined to give evidence personally before the committee. On the appearance, however, of the report of the Committee he wrote a reply to it which appeared as a pamphlet. The report was admitted on all hands to be a fair and well-reasoned document in which certain legitimate criticisms of the administration found their place, and in so doing supported some of Dr. Lomax's statements, but his general allegations were refuted.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

Pharmacy and Poisons Bill

IN the House of Lords on March 16th the Pharmacy and Poisons Bill was agreed to on Report.

Health in the Villages

In the House of Commons on March 15th, on a motion calling attention to the plight of rural industries, Dr. O'DONOVAN said that if village life and village industries were to prosper there must be a fostering care on the part of the Government of the village labourer's wife. There could be nothing more disheartening than for a village labourer's wife to come to London and see the lavish social services at the disposal of her sister in the city, and to compare that with the impoverished social services at the disposal of the village labourer's wife. They could see arising in every city expensive buildings, staffed by an expensive body of experts for maternity and sickness, but in the country village the country doctor suffered in contrast with the panel practitioner in the town. The village midwife, too, worked under great difficulties and her returns hardly paid for her existence. To ask rural life to prosper under these conditions was to ask a lot, and he was sure that the Government must give a care to the return to the country of some of the money they took from the rural areas in the form of social services comparable to those received by town dwellers. It might be difficult, but difficult problems should be the test of good administration. If village life was to prosper there must be a complete culture; and in addition to the village parson they must have a first-class village teacher and parish doctor, and, he thought, a squire. There must be leaders in the social, medical, clerical, and teaching world, and then civilisation in the country would be complete and be able to stand against the false blandishments of town life. When men decayed in the villages the country could not prosper. He therefore supported the terms of the motion which asked the Government to give a care to village rural life.

Major ELLIOT (Minister of Agriculture) said that he appreciated the necessity that the services which were available for the town dweller should to some extent be available for the country dweller also. Efforts must be made to see that the rural housewife had access to sources of clean water, and that when she was bearing children she had the same services as those afforded to her sisters in the towns and living nearer to the great centres of medical research and education. The encouragement of rural industries and the maintenance of a pride in village life were, he said, fundamental to the policy of the Government. If they could make life in the country healthy, tolerable, and cultured, they would find people returning there.

General Exchequer Contributions Bill

In the House of Commons on March 16th the Local Government (General Exchequer Contributions) Bill was read the third time.

Shop Assistants' Hours

On March 17th in the House of Commons Mr. MORGAN JONES moved the second reading of the Shops Acts (1912 to 1928) Amendment Bill. He said that in 1930 a Bill limiting shop assistants hours to not more than 48 per week was given a second reading in the House of Commons and referred to a Select Committee, which heard a large number of witnesses and presented a report. Many of the Committee's conclusions were embodied in the present Bill. Clause 1 laid down the general principle of a 48-hour week and provided that no young person might work longer, but that shop assistants over 18 years of age might work more than 48 hours per week if a local board, composed of employers and employed, had agreed to overtime employment and a local order was in force. The Secretary of State was given power under Clause 6 to fix hours of overtime employment where there was substantial disagreement on the local board.

Mr. MITCHESON moved:

That this House, while recognising the undesirability of shop assistants working excessive hours, declines to give a second reading to a Bill which would not only involve local authorities in increased expenditure in securing its enforcement, but would also add to the existing burdens on industry by hampering business and increasing the cost of distribution, and would be bound to lead either to an increase in retail prices or to a reduction in the wages of shop assistants.

Mr. HACKING (Under Secretary, Home Office), replying for the Government, said that in practice the majority of adults in shops were only working between 48 and 60 hours a week—an average of approximately 54 hours a week. The Government had sympathy with shop assistants, but this Bill would entail expenditure on local authorities and on the National Exchequer which could not be afforded at the present time. But apart from the expense, the question arose whether the measure was really desirable. By passing the Bill the House might well damage the taxpayer and the ratepayer without offering much, if any, benefit to the shop assistants themselves. The Government did not desire, however, to take up a completely *non-possumus* attitude in regard to the employment of young persons in shops under 18. The present old Act gave inadequate protection to these young persons. The Government were at this moment giving close attention to that aspect of the question, and while he could give no pledge as regarded the introduction of legislation

on the subject, he agreed that the matter was very important. The Government would oppose the second reading of this Bill.

The Bill was talked out.

Essex County Council Bill

The Essex County Council Bill (which provides for the licensing of establishments in the county for massage and special treatment, and exempts establishments carried on by medical practitioners) was read a second time in the House of Lords on Thursday, March 16th, and was referred to a Select Committee.

HOUSE OF COMMONS

WEDNESDAY, MARCH 15TH

Tuberculosis in the Navy

Sir BERTRAM FALLE asked the First Lord of the Admiralty the number of naval ratings invalided during the year Jan. 1st to Dec. 31st, 1932; the total number invalided with tuberculosis during this period; and the number invalided with tuberculosis whose disability was accepted as attributable to service.—Sir BOLTON EYRES-MONSELL replied: The number of naval ratings and Royal Marines invalided during the year 1932 was 979. The number invalided during that period with pulmonary tuberculosis was 190, and in 148 of these cases pensions were granted on the attributable scale.

Smell of Sewage at Chiswick

Mr. MITCHELL asked the Minister of Health whether he had inquired into the complaints received from residents in Chiswick with regard to the odour arising from the Chiswick sewage works; and, if so, whether he proposed to take any steps in the matter.—Mr. SHAKESPEARE (Parliamentary Secretary to the Ministry of Health) replied: My right hon. friend is investigating these complaints and is in close touch with the council as to the measures to be taken. It is hoped that a remedy will shortly be found.

THURSDAY, MARCH 16TH

Health Insurance Medical Benefit

Mr. BANFIELD asked the Minister of Health whether he was aware that in June next many unemployed persons would be in arrears as members of their approved societies under the National Health Insurance Acts; that sums up to 18*s.* would have to be paid to clear these arrears; that in many cases payment of these arrears would not entitle the persons concerned to health benefits on account of not having been employed for a considerable time in an insurable occupation; and that, owing to the complexity of the law, many of them were ignorant of their position; and whether he would take steps to avoid the hardship which would follow.—Sir E. HILTON YOUNG replied: The cases to which the hon. Member refers arise under the provisions of the National Health Insurance Act, 1932. These were fully explained when the Bill was before the House and all insured persons were informed of the changes by a leaflet issued at the end of last year. All possible steps are being taken to ease the position for the insured persons affected, and arrangements have been made under which arrears due to unemployment may be redeemed by instalments at any time from now to the end of November next.

Rural Housing

Sir PERCY HURD asked the Minister of Health whether the contribution of £1 per house payable by a county council under Section 34 (2) of the Housing Act, 1930, towards the provision of a house for a member of the agricultural population in a rural district applied to the case of rehousing under a clearance or improvement scheme; what in that event was the total weekly rent equivalent of the assistance obtainable under the Act for slum clearance; and whether means would be taken to make this position more widely known among county and district authorities.—Sir E. HILTON YOUNG replied: The reply to the first and third parts of the question is in the affirmative. For each three-bedroomed house provided under the Act the total of the contributions under the Act is approximately equivalent to a weekly sum of 5*s.* If the house is in an agricultural parish the weekly equivalent is 5*s.* 6*d.*

Voluntary Contributors

Mr. DAVID GRENFELL asked the Minister of Health whether, in connexion with any forthcoming extension of voluntary contributions to national health insurance, and in view of the large numbers of previous contributors who have been forced to leave insurable occupations, he would consider giving to them an opportunity to regain membership by payment of voluntary contributions, as was provided in the Act of 1925, for the provision of widows' and orphans' old age pension benefit to insured contributors.—Sir E. HILTON YOUNG replied: No extension of the scope of voluntary insurance under the National Health Insurance Acts is in prospect, and therefore the remainder of the question does not arise. The persons to whom the hon. Member refers have for the most part already had an opportunity of becoming voluntary contributors under existing legislation.

MONDAY, MARCH 20TH

Death at Wrestling Contest

Mr. CLYDE WILSON asked the Home Secretary whether his attention had been drawn to a fatality which occurred at an all-in wrestling contest at Sheffield, and the fact that similar contests were taking place in many parts of the country; and whether he would amend the law so as to enable local licensing authorities to regulate and control this form of entertainment.—Sir J. GILMOUR replied: I have seen a reference to this contest in the press and I am making inquiry into the circumstances. I have no information that similar contests are frequent and I am not at present in a position to say whether any amendment of the law is necessary.

TUESDAY, MARCH 21ST

Milk for Expectant Mothers

Miss RATHBONE asked the Minister of Health whether he was aware that analysis of the reports of the medical officers of health showed that only about half of the county councils and about a fourth of the borough councils exercised their power to provide milk for expectant mothers du-ing the last three months of pregnancy and during lactation; and whether, in view of the high maternal mortality-rate and the privation being suffered by many mothers owing to their husbands' unemployment, he could take steps to urge on local authorities that they should all put this power into operation.—Mr. SHAKESPEARE (Parliamentary Secretary to the Ministry of Health) said that information available to the Department indicated that such provision was made by at least 80 per cent. of the county and borough councils. There was much variation in the use that was made of the milk, but the Minister of Health did not think that the issue of a circular, on the general provision made, would be useful. Action was taken in individual areas where his right hon. friend was satisfied that it was necessary.

Chemical Treatment of Sewage

Mr. KIRKWOOD asked the Secretary for Scotland whether, in view of the complaints of the Clydebank Town Council and other local authorities regarding the action of the Glasgow Corporation in suspending, for reasons of economy, the chemical treatment of sewage entering the river Clyde at Dalmuir, he would request the Glasgow Corporation to reconsider the decision, in view of the danger to public health caused by the suspension of chemical treatment—Mr. SKELTON (Parliamentary Under-Secretary of State for Scotland) said that the Department of Health for Scotland had received no complaints regarding the action of the Glasgow Corporation in suspending the chemical treatment of sewage entering the river Clyde from the sewage works at Dalmuir, and he was informed that the medical officer of health of Glasgow was of opinion that there had been no danger to public health arising from the action taken. The matter was, however, considered by the Corporation on the 16th inst., when they approved a recommendation that provision should be made in their next year's estimates for the resumption of the chemical treatment of the sewage at the sewage works as from June 1st, 1933.

Vaccination and Death Certificates

Mr. GROVES asked the Minister of Health how many death certificates were received during 1932 on which vaccination or vaccinia was mentioned as a cause of death; and the ages of the persons to whom those certificates referred.—Sir E. HILTON YOUNG (Minister of Health) said that three such certificates were received in 1932. The ages of the deceased persons were 3 months, 5 months, and 6 months, respectively. In addition, there were five cases in which the practitioner had entered vaccinia or vaccination as one of the causes of death, but where in the course of the customary inquiries it was ascertained that neither vaccinia nor vaccination had contributed to the fatal issue, and the original certificate was withdrawn.

Milk Marketing

Mr. LEONARD asked the Secretary for Scotland whether the report covering the inquiry into the Milk Marketing (Scotland) scheme had been prepared; and whether it was intended to publish it, and when.—Sir G. COLLINS (Secretary of State for Scotland) said that the answer to the first part of the question was in the affirmative. He had considered the report and hoped to be in a position to submit the scheme to Parliament at an early date; but he did not propose to publish the report.

PART-TIME CONSULTANT AND SPECIALIST SERVICE

CRITICISM OF L.C.C. PROPOSALS

A MEETING of London consultants affected or likely to be affected by the proposals of the London County Council for consultant and specialist services (set out in THE LANCET of March 11th, p. 552) was held on March 20th at B.M.A. House. It was a very large meeting; every teaching hospital was represented, in most cases by both senior and junior members of the staff.

After a lively discussion the following resolutions were passed :—

(1) That this meeting expresses dissatisfaction with the terms and conditions of service for part-time consultants and specialists offered by the L.C.C., especially in regard to the rate of remuneration, length of the session, pay of anæsthetists, the conditions attached to holidays and sick leave; as well as the inadequate provision for emergencies. This meeting also instructs the committee to seek an interview with the central public health committee of the L.C.C. in order to present the views of the consultants and specialists as expressed in the memoranda already submitted to the chief medical officer of the L.C.C.

(2) That the attention of the central public health committee of the L.C.C. be also directed to the absence from its scheme of any special arrangements for the provision of consultants in physical medicine.

(3) That representations be made to the chief medical officer of the L.C.C. that the date by which applications for these posts must be received by the L.C.C.—namely, March 31st, 1933—should be postponed until a later date in order to allow the representations of this meeting to be considered by the L.C.C.

We are indebted to the medical secretary of the British Medical Association for details of the memoranda referred to in the first resolution, and for an account of the circumstances leading up to the meeting.

Events Leading to the Meeting

At the beginning of January all consultants and specialists in the employ of the L.C.C. received notices terminating their appointments as from March 31st, 1933. It was intimated that the question of whether or not they would be reappointed would depend upon the result of the consideration by the L.C.C. of the organisation of the consultant and specialist service. The medical secretary of the Association thereupon sought an interview with the medical officer of health of the L.C.C.

At the request of representative consultants a general meeting of all those affected was held at B.M.A. House on Jan. 17th, 1933. A subcommittee representative of all branches of consultant and specialist practice was set up with the following reference :—

To explore the position created by the London County Council's action in dismissing its part-time consultants and specialists, and to formulate general principles for submission to a second general meeting of part-time consultants and specialists affected.

That subcommittee prepared a memorandum and forwarded it to the medical officer of health of the L.C.C., assuring him at the same time of the desire of the consultants to coöperate in the friendliest possible way in the reorganisation of the consultant service.

GENERAL PRINCIPLES

The memorandum dealt first with general principles, setting out the advantages to all parties of a system of consultant service that allows considerable freedom of action and the stimulus of private practice; of intimate coöperation between municipal and voluntary hospitals, involving a ready interchange of consultants; and of a uniform standard of consultant service. The hope was expressed that the L.C.C. "will adapt its machinery of selection and appointment so as to secure that the merits of applicants for consultant posts are judged by men whose professional standing and contact with clinical medicine enables them fairly to estimate their professional worth," and that "the clinical material of the Council's hospitals will be made available in an increasing measure for the education of the medical student." It was urged that the consultants and specialists at present employed should have priority of consideration in future appointments, and their willingness to coöperate and to comment on proposals for reorganisation was emphasised.

DETAILED PROPOSALS

The following more detailed proposals were submitted for the consideration of the L.C.C., with the idea that their adoption would tend to improve the quality and efficiency of the service.

It is believed that, in general, employment on a regular sessional basis at a fixed annual salary represents the best type of appointment. If the Council's hospitals are to be grouped on a geographical basis, an opportunity would present itself to make available for every hospital within a group a complete team of consultants and specialists.

It is hoped that there will be in the Council's plan administrative provision for inter-availability between groups of hospitals in order that a consultant may, if necessary, obtain a second opinion from a consultant in any group. Thus the group team of consultants, complete in itself, could have at its disposal the special knowledge and experience of consultants in other groups. The creation of consultants' committees on a group or hospital basis would enable consultants to give expression to their views on the purely professional problems arising within the group. Such a means of collaboration and communication would safeguard against the danger of isolation, and would enable consultants to make suggestions through the appropiate channels for the improvement of their service.

It is hoped that the terms and conditions of service will include provision for a recognised annual holiday, and that the Council will provide locum tenentes for service during such annual holidays and during periods of sickness.

The British Medical Association has adopted a minimum scale of salaries for part-time consultants and specialists, and the L.C.C. will, the consultants trust, erect their scales of salaries on this basis. It is believed that seniority and length of service should be recognised by increased remuneration.

The Council's consultants and specialists suggest that the system under which a consultant physician (general or special) attends at specified times to examine and advise upon selected cases should be preserved and that the work should be of a purely consultative nature. It is hoped that the Council in planning group teams of consultants, will make available in each group containing hospitals where children are accommodated, a physician specialising in children's diseases.

Surgical appointments (general and special) at present exhibit a wide variation and it is suggested that in the Council's plan of reorganisation there should be provision for a weekly consulting visit at an annual salary. In the matter of payment for operations it is felt that when frequent operating is required a flat rate of payment is preferable to a "per operation" basis. In those hospitals where only occasional operating by the surgeon is required a "per operation" basis might be adopted.

It is hoped that in planning its ophthalmic service the Council will distinguish between the ophthalmic surgeon and the refractionist, and that the former will not be called upon to do routine refraction work. It is a commonplace that an adequate supply of qualified nurses experienced in ophthalmic work is necessary for efficient ophthalmic surgery. If the group system is adopted the concentration of ophthalmic surgery at one hospital of a group would

probably result in a higher standard of nursing and other assistance.

The advisability of separating the appointment of radiologist from that of practitioner in physical medicine in any new scheme for a consultant service is submitted for the consideration of the Council. The provision of a medically qualified radiologist and a qualified radiographer in each X ray department are essential to efficient work. It is hoped that the Council will recognise that the work of the radiologist is performed in places and under conditions which may lead to a high incidence of ill health, and that this will be borne in mind in estimating remuneration and in the provision of holidays.

The Council's consultants and specialists have set up a small committee, representative of all branches of specialist service and instructed it to place its knowledge and experience at the disposal of the Council's medical staff in the task of preparing plans of reorganisaion. If in correspondence or by personal interview this committee can make a contribution that will assist in this work of planning, it is hoped that the Council will not fail to avail itself of this offer of whole-hearted coöperation.

On Feb. 13th the medical officer of health of the L.C.C. invited the consultants' subcommittee to meet him at County Hall. The meeting took place and the memorandum was discussed in some detail with him and his staff, discussion being confined to the proposals embodied in the memorandum.

The publication of the County Council's agenda for its meeting on March 7th was the first intimation that the central public health committee of the L.C.C., on the advice of its staff, had prepared a plan of reorganisation and the terms and conditions of service for consultants. Thus the consultants had no opportunity of considering the L.C.C.'s proposals in detail until after the London County Council had approved the report of its central public health committee.

MEDICAL NEWS

Royal College of Surgeons of England

Two Leverhulme research scholarships will shortly be awarded by the college. Each scholarship will be of the annual value of £400, and there will be a further allowance not exceeding £100 for expenses of research. The appointments will be for one year in the first instance, the renewals being at the discretion of the council. The scholars must be British subjects and possess a medical qualification. They must devote themselves to the investigation of some biological or clinical problem of disease as it occurs in man, with a view to the extension of surgical knowledge. Facilities for research will be provided at the Buckston Browne surgical research farm at Downe, Kent, and scholars may be required to live there. Some scholars may be permitted to work in the laboratories in Lincoln's Inn Fields. Applications, stating the nature of the proposed research and accompanied by a recommendation from a member of the staff of the applicant's medical school or university, should be sent to the secretary of the college at Lincoln's Inn Fields, London, W.C.2, before April 1st.

Society of Apothecaries of London

Some modification in the examination for the diploma of Mastery of Midwifery is to be made in view of the qualifications—theoretical, practical, and administrative—necessary for the successful conduct of antenatal and infant welfare clinics. The court considers it desirable that a knowledge of the application of the principles of public health and administrative practice to maternity and child welfare should be tested in a separate paper, instead of including questions on these subjects in the paper on obstetrics and pædiatrics. The new paper will be set and marked by examiners who have had wide experience in public health appointments. These arrangements will come into force at the May examination.

Action of Radium as Seen in the Pelvis

Dr. B. D. Pullinger will read a paper on this subject at a meeting of the London Association of the Medical Women's Federation, to be held at B.M.A. House, Tavistock-square, London, W.C., on March 28th at 8.30 P.M. The meeting is open to all medical men and women.

International Hospital Association

This association will hold its third International Hospital Congress from June 28th to July 3rd at Knocke-sur-mer, in Belgium. A five days' study tour in Holland will follow. Arrangements for the meeting are in charge of the association belge des Hôpitaux, 80, rue de Livourne, Brussels.

Eugenics Society

At a meeting of this society to be held at the rooms of the Linnean Society, Burlington House, Piccadilly, London, at 5.30 P.M. next Tuesday, March 28th, Prof. Muckermann will speak on New Researches on Eugenics and the Trend of the Race. The address of the society is 20, Grosvenor-gardens, S.W.1.

London Inter-Collegiate Scholarships Board

The board announces that an examination for 15 medical scholarships and exhibitions, of an aggregate total value of £1858, will begin on May 15th. They are tenable at University College and University College Hospital Medical School, King's College and King's College Hospital Medical School, the London (Royal Free Hospital) School of Medicine for Women, and the London Hospital Medical College. Full particulars and entry form may be obtained from the secretary of the board, Mr. S. C. Ranner, the Medical School, King's College Hospital, Denmark Hill, S.E.5.

University of Birmingham

On his retirement from the chair of forensic medicine and toxicology the court of governors has elected Prof. J. T. J. Morrison, F.R.C.S., emeritus professor and a life governor of the university.

Journées Médicales de Bruxelles

This congress will hold its thirteenth meeting from June 24th to June 28th, under the presidency of Prof. Valère Cocq. The principal subject of discussion will be syphilis in its relation to the various medical specialties. The secretary-general is Dr. René Beckers, 141, rue Belliard, Brussels.

Instruction for the D.P.H.

A three months' course of lectures and demonstrations on clinical practice and in hospital administration is now being given at the Brook Hospital, Shooter's Hill, Woolwich, London, S.E., by Mr. J. B. Byles, the medical superintendent, on Mondays and Wednesdays at 9.30 A.M. and alternate Saturdays at a time to be arranged. Applications should be sent to the Medical Officer of Health, London County Council, Public Health Department (Special Hospitals), The County Hall, S.E.1.

Irish Medical Schools and Graduates' Association

The annual dinner of the association was held on Friday last, March 17th, at the Dorchester Hotel, London, and was presided over by Dr. T. G. Moorhead, Regius professor of physic at Trinity College, Dublin, and president-elect of the British Medical Association. After the loyal toasts Dr. Moorhead announced that the Arnott memorial medal had been presented to Flight-Lieutenant James MacConnell Kilpatrick. The toast of the guests was proposed by Dr. J. E. A. Lynham and responded to by Sir Dunbar Plunket Barton. Dr. W. J. O'Donovan, M.P., proposed the toast of prosperity to the association, and Prof. Moorhead briefly replied. In the course of the dinner Mrs. Claude Beddington told a short series of stories illustrative of Irish humour, both the anecdotes and the witty manner of their delivery being much appreciated by the company.

Nurses' Home at Govan

Lady Mason last week opened a new nurses' home at the Elder Cottage Hospital, Govan, Glasgow, which has cost over £4000 and has liberated space for the use of patients. It is hoped to provide a laboratory for chemical and bacteriological investigations.

Tuberculosis Association

This association will hold a provincial meeting at Cardiff from Thursday, April 6th, to Saturday, the 8th. On the 6th, Dr. Rist, of the Hospital Laennec, Paris, will read a paper on the Curative Influence of Certain Pleural Effusions in Artificial Pneumothorax, and Mr. H. Morriston Davies will speak on the After-results of Phrenicotomy. The morning of April 7th is being devoted to the consideration of the problems of genito-urinary tuberculosis. Prof. A. von Lichtenberg, of Berlin, is reading a general paper, and afterwards Mr. T. E. Hammond will deal with the subject in its relation to Wales. A symposium on the life and work of Dr. Marcus Paterson will be opened by Prof. S. Lyle Cummins. The annual general meeting of the association will be held on April 8th. There will also be an exhibition of apparatus, films, and specimens, and short reports of cases. All the meetings will take place at University College, Cathays Park. There will be visits to Glan Ely and Cefn Mably Hospitals during the conference. Further information may be had from the local secretary, Dr. J. C. Gilchrist, 10, The Parade, Cardiff.

London Homœopathic Hospital

At last week's annual meeting it was reported that the extensions had been completed at a cost of £21,633, and the total number of beds increased to 200. There was a deficit on the year of £2582.

A Children's Hostel

The Queen last week opened the new hostel and nursing school of the National Children Adoption Association at Sydenham Hill, which has accommodation for 40 babies and 20 nurses.

St. Andrew's Hospital, Dollis Hill

Last year this hospital, which is chiefly for the professional and middle-classes, received 1253 in-patients. More than 420 out-patients, accidents, and other urgent cases were dealt with, although the hospital has no special out-patients' department. The accumulated deficit of nearly £3000 was paid off by an anonymous gift, but the total liability, including the debt on the first portion of the nurses' home, the new pavilion, &c., is about £9250.

New Hospital at Lahore

Lady Willingdon recently opened the final portion of the new Lahore hospital for women and children, which is named after her. The building has been under construction since 1925, and has been opened in sections; it has cost £90,000. There are 64 beds, and in its design and equipment the hospital is the most modern in India; last year there were 1800 in-patients. Last week's ceremony was the opening of the main operating block, fitted with an air-conditioning plant which dispenses with fans in summer and fires in winter.

Royal Free Hospital

At the annual meeting last week Lord Riddell, the president, stated that last year the hospital treated 5903 in-patients and 50,515 out-patients, including children attending the dental clinic. Thanks to windfalls income exceeded expenditure by about £8000, but there is an overdraft on general accounts exceeding £30,000, and maintenance costs £100,000 a year. The dental clinic has made great progress, and the opening of the whole of the wards for tonsil, adenoid, ear, and throat cases, which will add another 25 beds, is now contemplated. An arrangement has been made to provide £12,000 a year for ten years for the maintenance of the dental clinic.

Progress of Cremation

The setting up of a National Council for the Disposition of the Dead was announced at the annual meeting of the Cremation Society in London on March 15th, when it was stated that the need for an authoritative body representative of all interests concerned has long been felt, especially in view of the increasing difficulties of local authorities in finding land suitable for cemeteries. The annual report of the Society stated that during the past year two new new crematoria had been opened, bringing the total in the country to 24, while the number of cremations had increased by 21 per cent., giving a total of 6315. The number of cremations had trebled in the last ten years and the society was convinced, from the ever-increasing demand for information received from municipal and other authorities, that the advance would be more rapid in the near future. The facilities for cremation at reduced fees offered by most cremation authorities to those insured under the National Health Insurance Acts, and their dependants, had brought cremation within the reach of many who might have been deterred from it from reasons of economy, or who were under the inpression that cremation was more expensive than earth burial. Apart from questions of transport the cost of cremation compares favourably, it is stated, with ordinary burial.

Medical Diary

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
MONDAY, March 27th.—8 P.M., ODONTOLOGY. Clinical Meeting.
TUESDAY.—5 P.M., MEDICINE. A Clinical Meeting will be held at St. Bartholomew's Hospital, E.C. Tea at 4.30 P.M. 5.30 P.M., ORTHOPÆDICS. (Cases at 4.30 P.M.)
WEDNESDAY.—8.30 P.M., SURGERY. Annual General Meeting. Paper: Mr. T. P. Dunhill: Diaphragmatic Hernia. Film: Mr. A. Edmunds: Hypospadias.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street Cavendish-square, W.
MONDAY, March 27th.—8.30 P.M., Discussion on Headache and Pain in Relation to Chronic Inflammation of the Nasal Accessory Sinuses. To be introduced by Mr. Herbert Tilley and Dr. Wilfred Harris.

NORTH-WEST LONDON MEDICAL SOCIETY.
TUESDAY, March 28th.—9.30 P.M. (at 110, Walm-lane, N.W.), Dr. T. C. Hunt: Recent Advances in Medicine, to be followed by a discussion.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, March 27th, to SATURDAY, April 1st.—BETHLEM ROYAL HOSPITAL, Monks' Orchard, Eden Park, Beckenham, Kent. Tues. and Fri. at 11 A.M. Course in Psychological Medicine.—INFANTS HOSPITAL, Vincent-square, S.W. Course in Diseases of Infants. Afternoons.—ROYAL EYE HOSPITAL, St. George's-circus, S.E. Course in Ophthalmology. Afternoons.—ROYAL ALBERT DOCK HOSPITAL, Royal Albert Dock, S.E. Week-end Course in Clinical Surgery. All day, Sat., April 1st, and Sun., April 2nd.—NATIONAL TEMPERANCE HOSPITAL, Hampstead-road, N.W. Tues. and Thurs. at 8 P.M. Evening F.R.C.S. Courses.—ROYAL WESTMINSTER OPHTHALMIC HOSPITAL, Broad-street, W.C. Thurs., 8 P.M. Demonstration on Some Points in Medical Ophthalmology (illustrated by epidiascope) by Mr. C. L. Gimblett. (Specially suitable for M.R.C.P. candidates.)

ST. MARK'S HOSPITAL, City-road, E.C.
THURSDAY, March 30th.—4 P.M., Mr. W. B. Gabriel: Injection Treatment of Hæmorrhoids and Anal Fissure.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.
FRIDAY, March 31st.—4 P.M., Mr. A. Ryland: Œsophagoscopy.

ST. PETER'S HOSPITAL FOR STONE, Henrietta-street, W.C.
WEDNESDAY, March 29th.—3 P.M., Mr. J. Swift Joly: Vesical Calculi.

NATIONAL HOSPITAL, Queen-square, W.C.
MONDAY, March 27th.—2 P.M., Dr. Riddoch: Out-patient Clinic. 3.30 P.M., Dr. Symonds: Head Injuries.
TUESDAY.—2 P.M., Dr. Walshe: Out-patient Clinic. 3.30 P.M., Dr. Symonds: Head Injuries.
WEDNESDAY.—2 P.M., Dr. Martin: Out-patient Clinic. 3.30 P.M., Dr. James Collier: Clinical Demonstration.
THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Dr. Riddoch: Heredo-familial Nervous Diseases.
FRIDAY.—2 P.M., Dr. Adie: Out-patient Clinic. 3.30 P.M., Mr. Elmquist: Demonstration of Re-educative Exercises (in Exercise Room).

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.
MONDAY, March 27th.—10 A.M., Medical and Surgical Wards, Skin Clinic. 2 P.M., Eye and Gynæcological Clinics. 4.15 P.M., Mr. Gibb: Demonstration of Eye Cases.)
TUESDAY.—10 A.M., Medical Wards. 11 A.M., Surgical Demonstration. 2 P.M., Throat, Nose and Ear Clinic. 4.15 P.M., Lecture: Mr. Woodd Walker: Peri-anal Problems.
WEDNESDAY.—10 A.M., Medical and Children's Wards, Children's Clinic. 2 P.M., Eye Clinic. 3.45 P.M., Venereal Diseases.
THURSDAY.—10 A.M., Neurological Clinic. 11.30 A.M., Fracture Demonstration. 2 P.M., Eye and Genito-urinary Clinics. 4.15 P.M., Lecture: Dr. Shaw: Test-meals.
FRIDAY.—10 A.M., Skin Clinic. 12 noon, Lecture on Treatment. 2 P.M., Throat, Nose and Ear Clinic. 4.15 P.M., Lecture: Dr. Konstam: Anhæmopoietic Anæmia.
SATURDAY, April 1st.—10 A.M., Medical and Surgical Wards, Children's Clinic.
Daily.—2 P.M., Operations, Medical and Surgical Clinics. The Lectures at 4.15 P.M. are open to all Medical Practitioners without fee.

MANCHESTER ROYAL INFIRMARY.
TUESDAY, March 28th.—4.15 P.M., Mr. W. R. Douglas: Some Surgical Problems of the Colon.
FRIDAY.—4.15 P.M., Dr. E. B. Leech: Demonstration of Medical Cases.

ANCOATS HOSPITAL, MANCHESTER.
THURSDAY, March 30th.—4.15 P.M., Mr. E. E. Hughes: Renal Tumours.

GLASGOW POST-GRADUATE LECTURES.
WEDNESDAY, March 29th.—4.15 P.M. (at the Western Infirmary), Mr. J. G. Tomkinson: Skin Cases.

Appointments

CAREW-SHAW, E., F.R.C.S. Eng., has been appointed Surgeon to the Ear, Nose and Throat Department of the Bolingbroke Hospital.

Certifying Surgeons under the Factory and Workshop Acts: BAILEY, G., L.R.C.P. Lond., M.R.C.S. (Blackburn); GREENISH, H., L.R.C.P., M.R.C.S. (Fleet, Southampton); GABE, L. S., L.R.C.P. Lond., M.R.C.S. (Reynoldston); KENNEDY, J. J., M.B., B.Ch. N.U.I. (Tuxford); and PALMER, R., L.R.C.P. Lond., M.R.C.S. (Lydd, Kent).

NOTES, COMMENTS, AND ABSTRACTS

NICHOLAS CULPEPER *

By CECIL WALL, D.M., F.R.C.P.
MASTER OF THE SOCIETY OF APOTHECARIES OF LONDON

Nicholas Culpeper was born in London on Oct. 18th, 1616, the posthumous son of the Rev. Nicholas Culpeper, of Ockley in Surrey. His mother was the daughter of the Rev. William Attersol, the minister of Isfield, Sussex. His paternal grandfather was Sir Thomas Culpeper, Bart., of Wakehurst, Sussex. Nicholas was educated at a free school in Sussex, possibly at Lewes, and when he was 18 it was planned that he should go to Cambridge, but though it is often stated that he resided at the University his name does not appear in the records of any of the colleges. An account of his life, prefixed to one of his works, "The School of Physic," supplies a dramatic explanation. Nicholas had planned a runaway match with a neighbouring young lady, an heiress, and his projected journey to Cambridge suggested a favourable opportunity for elopement. The lady agreed to meet him near Lewes, but on her way to the trysting place was killed by lightning. In the story we are left to imagine the reception of the news by the parents, but the result was that on Nov. 14th, 1634, Culpeper was bound apprentice for eight years to Simon White, an apothecary, who lived near Temple Bar, his grandfather, Attersol, paying the premium of £50. Two and a half years later Simon White got into financial difficulties and had to leave London. Nicholas was consequently turned over to Francis Drake, of Threadneedle-street. Francis Drake was only made free of the Society of Apothecaries in 1628, so he was probably little older than Culpeper, while a fellow apprentice, Samuel Leadbeater, bound to Drake in 1631, was presumably of about the same age. It is said that Culpeper, who had had a good preliminary education, having stayed at school until he was 18, was employed during his servitude in teaching his master Latin. On Feb. 19th, 1639, Drake having died, both Culpeper and Leadbeater became bound to Stephen Higgins, who was then Master of the Society of Apothecaries. In the same year Leadbeater completed his eight years' apprenticeship and was made free of the Society and set up his shop in Bishopsgate. Culpeper continued to live with Leadbeater, having to serve until November, 1642, before he could obtain his freedom. But in 1639 his mother died and "left him well," and in the following year he broke his indentures, married a Miss Alice Field, and settled in Red Lion-street, Spitalfields. One, Marchamont Needham, of whom more anon, stated that Alice Field was a woman of the streets: there does not appear to be any justification for the statement. The couple lived together until his death and had seven children, only one of whom, however, survived him. After Culpeper's death the widow married John Heydon, an astrologer, and author of a book called "The Angelical Guide."

There is not much available information about the early years of Culpeper's married life. Considering his temperament and the opinions he subsequently expressed it is scarcely possible to believe that he did not take part in the political movements of the time. In May, 1642, he was for certain amongst the 8000 trained bands mustered in Finsbury Fields under Major General Skippon in response to the militia ordinance—"the thimble and bodkin" army, in the contemptuous words of the royalists. It appears that in 1643 he went for a soldier; thus he may have taken an active part in the relief of Gloucester by the City Militia. In this year he was wounded in the chest by small shot, and never recovered completely from the wound.

EARLY LITERARY ACTIVITIES

We pick up his history more certainly in 1649, when he published the first of his considerable list of works. This book, "The Physical Directory," occasioned a virulent attack by Marchamont Needham, to whom allusion has been made already. Needham was a freelance journalist without scruples, who changed sides as occasion seemed to demand. When he wrote this review he was a royalist—in spite of its venom it must have been grounded on facts, though their presentation was distorted to suit his purpose. One passage runs:—

> "There is now extant a book entitled 'A Physical Directory,' or a translation of the London 'Dispensatory' made by the College of Physicians in London, being that book by which all apothecaries are strictly commanded to make all their physic, done (very filthily) into English by one Nicholas Culpeper, who writes himself Equitis on one side of the book, gentleman on the other: and, indeed, he may be a Knight (though if it be but of the post), but I am sure no gentleman or scholar, that will take upon him to correct and abuse (as in most gross terms he hath done) the whole College of learned physicians. But, because you may know who this our learned translator is, be pleased (I do very earnestly entreat you) to take notice that he is son unto a Surrey parson and such a one as (he tells us in his epistle dedicatory) deceives men in matters belonging to their most precious souls. And his first step to this his great and vast knowledge was acquired thus: he was bound apprentice unto an apothecary in S. Helen's in Bishopsgate Street, but ran away (having served his own time, which was very short) from his master upon his lewd debauchery, and soon after married a wife (I will not say, as fame gives it out, a whore); however it was long before his time was out. This done he turns compositor, afterwards a figure-flinger (*astrologer*) and lived about Moorfield merely upon cozenage and cheating the poor people who had lost their waistcoat, aprons, smocks, &c. Then he commenced the several degrees of Independency, Brownism, Anabaptism; admitted himself of John Goodwin's school (of all ungodliness) in Coleman Street: after that he turned Seeker, Manifestarian and now he is arrived at the battlement of an absolute atheist and by two years drunken labour hath Gallimaufred the apothecaries book into nonsense, mixing every receipt therein with some scruples, at least, of rebellion or atheism, beside the danger of poisoning men's bodies. And (to supply his drunkenness and lechery with a thirty shilling reward) endeavoured to bring into obloquy the famous Societies of Apothecaries and Chirurgeons. And that you may know his person as well as his qualities, take notice that he hath got an old black cloak lined with plush by the means of his stationer who bought it him in Long Lane, to hide his knavery, being (till then) a most despicable ragged fellow: and yet he looks as if he had been stewed in a tan pit, being a drowsy headed coxcomb not worth the name of gentleman or scholar, and such a one as the people have cause to take heed of, in that he means to monopolise unto himself all the knavery and cozenage that ever an apothecaries shop was capable of, under the specious show of serving (though really of undoing) his country."

In spite of this review, or possibly as the result of the consequent notoriety, the Directory was an immediate success; the first edition in quarto was followed in 1650 by a folio edition, while third and fourth editions, both in folio, appeared in 1651 and 1653, and to the last one there was added the "Key to Galen." Peter Cole, his publisher, encouraged by the speedy exhaustion of the 1649 edition, immediately commissioned Culpeper to translate from the Latin other well-known medical works, and it is claimed that 17 of these had been completed for publication before Culpeper's death in 1654, attributed to consumption and over-smoking. In addition to the work he did for Peter Cole, he translated at least one book for another publisher, Nathaniel Brooke, the "Semeiotica Uranica, or an Astrological Judgment of Diseases," a translation of the works of Aven Ezra and Noel Duret. A second edition of this appeared in 1651, the date of the first edition I have not been able to trace. In 1652 a duodecimo volume appeared,

* Abbreviated from a paper read before the London Hospital Medical Society on Dec. 15th, 1932.

entitled "The English Physician," by N. Culpeper; the publisher's name is not given, but the portrait of Culpeper, which forms the frontispiece, is from the plate used by Brooke and it was advertised in Brooke's list of publications. In 1653 Peter Cole published "The English Physician Enlarged," in the preface of which Culpeper alludes to a pirated edition of 1652, and gives a list of the distinguishing points by which the genuine might be recognised from the spurious, which he said was full of errors.

THE "ENGLISH PHYSICIAN"

The "English Physician" was a herbal, and gave a description of all medicinal plants growing in England. It is this book which constitutes Culpeper's chief claim to originality. and it is unfortunate that the date of its first publication cannot be determined. Pulteney in his "Progress of Botany" (p. 180) wrote:—

> "Of the astrological herbalists Nicholas Culpeper stands eminently forward. His 'Herbal,' first printed in 1652, which continued for more than a century to be the manual of good ladies in the country, is well known and to do the author justice his descriptions of common plants were drawn up with a clearness and distinction that would not have disgraced a better pen."

Field botany entered very largely into the education of the apothecary of the period, and regular herborising excursions were organised by their Society. Parkinson published his "Paradisus" in 1629, and his "Theatrum Botanicum" in 1640. Johnson produced his edition of "Gerard's Herbal" in 1634. As an apprentice Culpeper received instruction and inspiration from such men as these, and when he turned author the material for a popular herbal was ready to his hand.

TRANSLATIONS AND FORGERIES

The great success which attended the publication of Culpeper's translations during his lifetime, and the knowledge that when he died much of his work remained unpublished, led to the ascription to him of many books for which he was in no wise responsible. Authenticity can be claimed with some measure of confidence for those books published by Peter Cole during his lifetime, that is between 1649 and 1653, and in the following few years. The translation of Glisson's treatise on rickets (1651) appears to be genuine, as is "The Directory for Midwives," based on the teaching of Mayerne (1651). Vesling's anatomy (1653) was undoubtedly translated by him. In the preface to this book Culpeper shows that he was not prepared to accept the doctrine of the circulation of the blood, of which Vesling, who was reader of anatomy at Padua, describing the action of the heart, adds: "The exact knowledge of this our age is beholding to William Harvey."

Of other books whose attribution to Culpeper as personally responsible is reasonable, we have "The Key to Galen" appended to the third edition of the Dispensatory, "Medicaments for the Poor," and "Health for the Rich and Poor by Diet without Physic"; the two last were translated from the original of J. Prevost, but were not published until 1656. But much of the work ascribed to Culpeper was done in collaboration with others, thus Abdiah Cole and William Rowland were joint translators of Rivière's "Practice of Physic." Rivière was the professor of medicine of Montpelier, and his work was a frequently used text-book of clinical medicine until the eighteenth century was well advanced. Other translations of continental writers appeared under the names of Culpeper and Abdiah Cole, but as they were published some years after Culpeper's death it seems probable that his name was added for the purpose of advertisement.

Shortly after her husband's death Mrs. Culpeper published a book called "Mr. Culpeper's Ghost," in which she vindicates the memory of her husband. From this we learn that Peter Cole had bought and paid for, during his life, 17 books written by Culpeper, and that after his death his widow had handed over to him 79 other books of his making or translating. We also get a sidelight on the practice of literary piracy prevalent at the period. Culpeper seems to have had the habit of making notes of any statement or observation on medical subjects brought to his notice. A servant named Ryves took possession of these notes after his master's death and sold them to Nathaniel Brooke. Brooke, who had already published the "Semeiotica Uranica" and the pirated "English Physician," promptly issued a book called "Culpeper's Last Legacy," containing a selection of the notes bought from Ryves. Mrs. Culpeper in her vindication complains of

> "the covetous and unjust forgeries of one who, though he calls himself Nathaniel is far from being an Israelite in whom there is no guile, who was not content to publish a hodgepodge of undigested collections and observations of my dear husband deceased, under the title of Culpeper's last legacy, but to make the deceit more taking, he steeled his forehead so far and brassed it so hard as not to be ashamed to forge two epistles, one in mine and the other in my husband's name, of the penning of which I never so much as dreamed."

Brooke was in no wise abashed by this denunciation, and further editions of the "Last Legacy" continued to appear. In 1656 Brooke published no less than five booklets built from Culpeper's odd notes: "Aphorisms," "Composita," "Febrilia," "Select Aphorisms," and "Select Medicinal Aphorisms." In 1659 he produced "The School of Physic," with a life of Culpeper, and in 1660 "Art's Masterpiece," which is undoubtedly spurious.

SCIENCE AND PRACTICE

In view of the doubtful authenticity of much of the literary output ascribed to Culpeper it is not easy to assess the value of his work. The herbal published under the title "The English Physician" has the greatest claim to originality and had the longest life, new editions being published at fairly frequent intervals. Even in the present century it has been published once more by Milner and Co. The merit of the book lies in the clear and fairly accurate description of English plants, both wild and cultivated; the plants are arranged in alphabetical order, and there is not any attempt at systematic classification. The description of the medicinal virtues of the plants is of but little value, and though Culpeper claimed that it was based on his personal experience and not on the authority of his predecessors it is obvious that his claim could not be substantiated. He attempted to replace traditional experience by hypotheses based on astrology which appear to-day to be utterly nonsensical, but were held to be sound not only by such contemporaries as Elias Ashmole and William Lilly, but also by many orthodox physicians. The second and more justifiable claim to fame is that he was a pioneer in translating into English medical literature which was then and for many years later written in Latin. The value of his books to students of medicine, both regular and irregular, can be measured by the frequency of the output of new editions. In the later seventeenth century the apothecaries were beginning to undertake independent medical practice; for the most part lacking a classical education they had hitherto been unable to acquaint themselves with the teaching of the great continental medical schools; henceforth the barrier was removed, and the first phase of the evolution of the apothecary into the general medical practitioner was begun. Little can be said in favour of Culpeper as a clinician; he was certainly no better, and probably not much worse, than his contemporaries who practised amongst the middle and lower classes. He translated Vesling's "Anatomy," but failed to recognise the value of anatomical knowledge to the physician; the study of physiology had barely been begun, and pathology to him was an upset of the balance of the humours under the influence of the planets.

His practice in therapeutics cannot be gathered from the nonsensical medley ascribed to him by

Nathaniel Brooke. Probably it differed but little from that of his contemporaries, but even in the books published during his lifetime by Cole he makes some strange recommendations. A cure for alcoholism is given in the "Dispensatory," and was certainly passed by him. "Eels being put into wine or beer and suffered to die in it, he that drinks it will never endure that sort of liquor again."

PERSONAL QUALITIES

Culpeper is described as being of middle stature, of a spare lean body, dark complexion, brown hair, rather long visage, piercing quick eyes, very active and nimble. He was "of an excellent wit, sharp fancy, admirable conception, and of an active understanding," yet occasionally the victim of extraordinary melancholy. He was a good orator, spoke fluently and very conceitedly, and full of jests—this tendency was inseparable from him, "so that in his most serious writings he would mingle matters of levity and extremely please himself in so doing." Culpeper himself wrote in the preface to the "Dispensatory" (1653 edition):

"If thou findest me here and there a little lavish in such expressions as many like not, I pray pardon that it is my dialect: I cannot write without it. I assure thee it was not premeditated. If thou thinkest I did it for gain thou art so far wide from the truth that unless thou change thy opinion 'tis to be feared Truth and you will not meet again in a long time." His comments upon the text of the Dispensatory are at times very pungent—in the preface he wrote "The liberty of our commonwealth is most infringed by three sorts of men—priests, physicians, and lawyers" and again "Papists and the College of Physicians will not suffer Divinity and Physic to be printed in our mother tongue, both upon one and the same ground and both cover it over with the same excuses." He called the College of Physicians "a company of proud insulting domineering doctors whose wits were born above 500 years before themselves." "Is it handsome and well beseeming," he asks, "to see a doctor ride in State in plush with a foot-cloth and not a grain of wit but what was in print before he was born?" with the qualification however that "its a devilish trade that had never an honest man in it." He seems to have originated the gibe about the customary fee "too many physicians in England are like Balaam's ass, they will not speak unless they see an angel: yet I accuse not all."

In "Culpeper's Ghost" his widow records many shrewd comments which she had found amongst his private papers. He rejoiced in the liberty of the free commonwealth, and prophesied the danger to progress in medicine if the kingship was restored "which will returning bring seven devils worse than itself. . . . Tyranny will be attended with a luxurious and debauched court. The prime factors of physic of the monopolising upstart London College will be called to secret court ministries and by influence will secure a royal decree that all books of physic in the English tongue are to be burnt by the hangman—especially at the Royal Exchange over against pestilent Peter's own shop." He seemed to expect the Restoration, and foretold that then the College would exert all its powers to prevent liberty in the practice of medicine. Culpeper here gave a very intelligent forecast of Charles II. charter to the College of Physicians in 1663, and of James II. action in entrusting the censorship of medical books to the College in 1687. In his comments on professional matters he gave high praise to Rivière for having written the best rules of physic in the Galenical way. He had formerly a high opinion of Chymists, but had begun to doubt whether Chymistry could replace the old approved Galenical and Hippocratical remedies that experience had confirmed. He laughs at the Trismegistian, Platonic, Rosicrucian followers of Paracelsus and van Helmont. He gives an imaginary conversation in the Elysian fields between Dr. Fludd, Raymond Lully, and van Helmont, who were plotting a "universal magnetic medicine for fevers which would work sympathetically if a few drops were put into the patient's urine."

A BRILLIANT FAILURE

Culpeper had a brilliant intellect, but in achievement was a brilliant failure. His vigorous imagination, his ready wit, his personality, his human sympathy, and his indefatigable energy would have fitted him for almost any other profession than that selected for him. Ambitious, conscious of his capacity, unable to control his emotions, he attacked almost single-handed those in the entrenched position of authority; he failed in the attack, but left a breach in the lines of defence. Had he been given an insight into the system of inductive reasoning or the experimental method in his preliminary education he would have achieved more, but if he had entered the law or the church his peculiar talents would soon have secured his pre-eminence. His output in the four years of his literary activity is amazing. A sense of duty and the impulse of charity seem always to have been the mainspring of his activities. His advice to the midwives was the guide to his own conduct. "Grave matrons be diligent in your office and be as careful as diligent, as well to prevent evils before they come as to provide for them when they come."

DUTY ON LETTER-PRESS

THE Import Duties Advisory Committee is considering whether the existing provisions for exempting newspapers, periodicals, printed books, and printed music from the general ad-valorem duty chargeable under Section I. of the Import Duties Act should be extended to cover (*a*) printed parts of newspapers, periodicals, and printed books; and (*b*) other letterpress matter printed on paper, except labels, bags, cartons, and wrapping materials. Any representations should be addressed before April 3rd to the secretary of the committee, Caxton House (West Block), Tothill-street, London, S.W.1.

THE MUSK-RAT IN BRITAIN

MANY of us regret the way in which the fauna and flora of this country are changing. Wild orchises and fritillaries disappear; the wild-cat and the badger leave the woods; and by way of compensation we have only an assurance that the total of species—counting all the humbler flowers of the dunghill and all the animal and vegetable pests of mankind and animals—is on the increase. One has to be a specialist to take much pleasure from the minor subdivisions of the aphidæ or from news that another variety of camomile is now firmly established. But it is hard not to feel an unregenerate thrill at the thought that a fine new animal like the musk-rat has now been added to the inhabitants of the English countryside.

It is, of course, a shocking business; and the man who introduced the musquash or musk-rat into this country in 1927—as an experiment in fur farming—must now be feeling as self-reproachful as the original patron of Australian rabbits. On the Ministry of Agriculture's emotions it would be improper to dwell, but its officials are evidently faced with a serious problem.

The musk-rat, as everybody now knows, is adventurous and difficult to confine; it lives mainly upon aquatic vegetation, and accordingly haunts the banks of rivers; and by extensive tunnelling—often invisible—it may so destroy or weaken embankments that they collapse in times of flood. Unfortunately, as Prof. James Ritchie [1] points out, their multiplication in Great Britain is uncontrolled by carnivorous animals such as minks, coyotes, and lynxes, which are found in North America. In the absence of biological control, climate and environment have alike favoured rapid breeding, and wild musk-rats have been found in Yorkshire, Surrey, Kent, and Essex, the Fen district, and near the Shrawardine Pool in Shropshire, which has been the chief centre of dispersal. About 70 miles of the Severn and its tributaries have been colonised, and in Scotland the animals have been reported in the counties of Kincardine, Perth, and Stirling, and perhaps in Aberdeenshire and Dumfries.

[1] Nature, March 18th, p. 385.

The Destructive Imported Animals Act of 1932 imposed restrictions on their importation, but came too late to prevent the damage; for Prof. Ritchie says that in the spring of 1931 nearly 200 people in Great Britain were already keeping musk-rats. From April 1st onwards, unless Parliament objects, no one will be allowed to import or keep them any longer, and Prof. Ritchie believes that the danger is already sufficient to warrant every effort to stamp out the breed. He advises trapping, and bombing of the lodges in which they congregate during the winter months.

The musk-rat is a vole and is, of course, much larger than the ordinary rat, measuring 22 inches from snout to tip of tail. It is covered with long, thick, brown fur, and the tail, instead of being round, is flattened to look like a razor-strop.

THEFT OF DRUGS FROM MOTOR-CARS

IN a letter to the General Medical Council the Commissioner of Police for London calls further attention to the number of thefts and losses of cases containing dangerous drugs, serums, and bacteria from motor-cars left unattended by doctors in the metropolitan area, and particularly in the neighbourhood of Harley-street. The attention of the public has, he says, been drawn to the risk of leaving removable articles unprotected in this way. "But in the case of dangerous drugs, bacteria, &c., the matter is not—as in ordinary cases—merely one of making crime easy and putting avoidable work on to the police, and the special importance of taking all possible precautions to prevent articles of this kind from getting into the hands of ignorant persons is sufficiently obvious."

A note about the broadcasting of warnings concerning stolen drugs and cultures appeared on p. 454 of our issue of Feb. 25th.

Vacancies

For further information refer to the advertisement columns

Beit Memorial Fellowships for Medical Research.—Jun. Fellows. Each £400.

Belgrave Hospital for Children, Clapham-road, S.W.—Two H.P.'s and H.S. Each at rate of £100.

Birmingham, Selly Oak Hospital.—Cas. O. At rate of £200.

Bristol University.—Sen. Pathologist for Dept. of Preventive Medicine. £700. Also Chair of Pathology.

Cambridge, Addenbrooke's Hospital.—Hon. Surgeon. Also Hon. Surgeon in charge of Ophthalmic Dept.

Cancer Hospital, Fulham-road, S.W.—H.S. At rate of £100.

Canterbury, Kent and Canterbury Hospital.—H.S. and H.P. Each at rate of £125.

Cardiff, Glan Ely Hospital, Fairwater.—Third Asst. Res. M.O. £250.

Cardiff, Welsh National School of Medicine.—Independent Lecturer in Materia Medica and Pharmacology. £750.

Central London, Throat, Nose, and Ear Hospital, Gray's-inn-road, W.C.—Asst. for Out-patient Dept.

City of London Hospital for Diseases of the Heart and Lungs, Victoria Park, E.—H.P. At rate of £100.

Doncaster Royal Infirmary.—Cas. H.S. £175.

Durham County Hospital.—H.S. £150.

Eastbourne, Princess Alice Memorial Hospital.—H.S. At rate of £150.

Edinburgh Royal Infirmary.—Two Clin. Assts. for Ear, Nose and Throat Dept.

Edinburgh Western General Municipal Hospital.—H.P. Also Jun. H.S. At rate of £100 and £50 respectively.

Essex County Council.—Ear, Nose and Throat Specialist. 50 guineas.

Guildford, Royal Surrey County Hospital.—Res. Med. and Surg. Officer and Registrar. £250. Also H.S. £150.

Halifax, St. Luke's Hospital.—Sen. Res. M.O. £350.

Harborough, Leicestershire and Rutland Mental Hospital.—Vacancies.

Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—Asst. Res. M.O. At rate of £150. Also H.P. and Jun. H.P. for Frimley Sanatorium. Each at rate of £50.

Hospital for Epilepsy and Paralysis, Maida Vale, W.—Res. M.O. and H.P. At rate of £150 and £100 respectively.

Hospital of St. John and St. Elizabeth, 60, Grove End-road, N.W. Res. H.S. At rate of £75.

Hull Royal Infirmary.—Asst. H.P. At rate of £150. Also H.S. to Sutton Branch Hospital. At rate of £160.

Ilford, King George Hospital.—Hon. Surgeon.

Inverness, Royal Northern Infirmary.—H.S. At rate of £100.

Kingston-on-Thames, Surrey County Mental Hospital Service.—Jun. Asst. M.O. £350.

Leeds Maternity Hospital, Hyde Terrace.—Sen. and Jun. H.S.'s. At rate of £52 and £26 respectively.

Liverpool Mill Road Infirmary.—Res. Asst. M.O. £200.

Liverpool, St. Paul's Eye Hospital, Oldhall-street.—H.S. At rate of £145.

L.C.C. Consultant and Specialist Service.—Neurologists £2 12s. 6d. Anæsthetists £1 14s. per session. Radiologists £900.

Maidstone, Kent County Ophthalmic and Aural Hospital.—H.S. to Ear, Nose and Throat. At rate of £200.

Manchester Children's Hospital, Pendlebury.—Res. Med. and Surg. O. Each at rate of £125.

Manchester, Victoria Memorial Jewish Hospital.—Res. M.O. At rate of £125.

Metropolitan Hospital, Kingsland-road, E.—Sen. and Jun. H.P.'s and H.S.'s. Also Two Cas. O.'s. Each at rate of £100.

Newcastle General Hospital.—H.S. At rate of £150.

Newcastle-upon-Tyne, Hospital for Sick Children.—H.P. Also Sen. and Jun. H.S. Each at rate of £100.

Nottingham City Education Committee.—Jun. Asst. School Medical Inspector. £500.

Nottingham General Hospital.—H.S. At rate of £150.

Paddington Green Children's Hospital, W.—H.P. and H.S. Each at rate of £150.

Plymouth, S. Devon and E. Cornwall Hospital.—Hon. Joint M.O. for Massage and Electro-therapeutic Dept.

Royal Free Hospital, Gray's Inn-road, W.C.—Res. Cas. O. At rate of £150.

Royal London Ophthalmic Hospital, City-road, E.C.—Refraction Assts. £100.

Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Asst. Dental Surgeon. 25 gns. Also Hon. Physician.

St. Mary's Hospital for Women and Children, Plaistow, E.—Res. and Asst. Res. M.O.'s. At rate of £175 and £120 respectively.

St. Thomas's Hospital, S.E.—Med. Reg.

Samaritan Free Hospital for Women, Marylebone-road, N.W.—H.S. At rate of £100.

Sheffield University.—Chair of Physiology. £1000–£1200.

South Eastern Hospital for Children, Sydenham, S.E.—Jun. Res. M.O. At rate of £120.

Southend-on-Sea General Hospital.—Cas. O., H.P., and Two H.S.'s. All at rate of £100.

South London Hospital for Women, Clapham Common, S.W.—Asst. Surgeon.

Stockport Infirmary.—H.P. £150.

Torquay, Torbay Hospital.—H.S. £175.

University College Hospital, Gower-street, W.C.—Hon. Anæsthetist.

Walsall General Hospital.—H.P. and Res. Asst. Pathologist. At rate of £150.

West Hartlepool, Hawbeck Infirmary.—Visiting Consultant for Diseases of the Eye, Ear, Nose and Throat.

West London Hospital, Hammersmith, W.—Non.-res. House Officer. At rate of £150.

Westminster Hospital, Broad-sanctuary, S.W.—Asst. Surg. Reg. and Radium Officer. At rate of £125.

Westminster Hospital Annexe, 66, Fitzjohn's-avenue, Hampstead. Res. M.O. £200.

Willesden General Hospital, Harlesden-road, N.W.—Asst. Surg. O. £50.

Wolverhampton Royal Hospital.—H.S. for Orthopædic Dept. and H.S. for Ear, Throat and Nose Dept. Each at rate of £100.

The Chief Inspector of Factories announces vacancies for Certifying Factory Surgeons at Rhyl, Flint, and at Falmouth, Cornwall.

A vacancy is announced for an Ophthalmic Specialist Medical Referee under the Workmen's Compensation Act, for the Bolton, Bury, Rochdale, Oldham, Salford, and the Wigan County Court Districts. Applications should reach the Private Secretary, Home Office, London, S.W., not later than April 5th.

Births, Marriages, and Deaths

BIRTHS

MCKINSTRY.—On March 13th, the wife of Dr. W. K. McKinstry, of Gwendwr-road, W., of a daughter.

PINHEY.—On March 16th, the wife of Eustace Townley Pinhey, M.B., Ch.M., Medical Officer, City of London Infirmary, Bow-road, London, of a son.

REID.—On March 16th, at Burntwood, Lichfield, Staffs, the wife of Dr. William Reid, of a daughter.

RUSSELL.—On March 16th, the wife of Dr. Brian Russell, of Broad-walk, Buxton, of a son.

SCHLESINGER.—On March 20th, the wife of Bernard Schlesinger, M.D., of Hollycroft-avenue, London, of a daughter.

MARRIAGES

JENKYN-THOMAS—MELLOR.—On March 15th, at St. Barnabas Church, Golders Green, John Edwin Jenkyn-Thomas, B.A. Cantab., M.R.C.S., L.R.C.P., to Frances, only daughter of Mr. and Mrs. Richard Mellor, Cranbourne-gardens, Golders Green, N.W.

DEATHS

DAVIES.—On March 17th, at the Forbes Fraser Hospital, Bath, Thomas Llewellyn Davies, M.R.C.S.

GOLDSBROUGH.—On March 17th, Giles Forward Goldsbrough, M.D., of Church Side, Herne Hill, S.E., and Welbeck-street.

LOMAX.—On March 17th, at Windlesham House, Shoreham-by-Sea, Sussex, Montagu Lomax, M.R.C.S., L.R.C.P., late of the Council for Lunacy Reform.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.